

Full Length Article

Open Access

Impact of Technical and Vocational Education and Training on Poverty alleviation through Skill Acquisition: Evidence from Developing Countries

Muhammad Yousaf¹, Arshad Ali Bhatti²

¹PhD Scholar, School of Economics, IIIE, International Islamic University, Islamabad.

²Assistant Professor, School of Economics, IIIE, International Islamic University Islamabad.

ABSTRACT

Purpose: This study aims to investigate the impact of technical and vocational education and training on alleviating poverty in developing countries while exploring the role of adult skills as a mediator and moderator.

Study Design/Methodology/Approach: It uses the unbalanced panel data of selected developing countries from 1970 to 2019 and employs the seemingly unrelated regression method for unbalanced panel data, as suggested by Biorn (2004) for the mediation analysis. While moderation analysis uses the fixed effects model.

Findings: The study affirms a significant negative nonlinear relationship between technical and vocational education and training and poverty. The indirect effect (mediation analysis) confirms the existence of partial mediation of adult skills; that is, adult skill acquisition is helpful for poverty alleviation. The moderation analysis supports the above result concluding that technical and vocational education reduces poverty at all levels of adult skills, however, it remains significant at low levels.

Originality/Value/Implications: This study contributes to the literature by examining the role of adult skills in the effect of technical and vocational education and training on poverty alleviation. Its findings can help policymakers consider technical training programs for youngsters and adult skill acquisition in the process of designing policies for reducing poverty.

Keywords: Technical and Vocational Education and Training, Adult Skills, Poverty, Panel Data

1. INTRODUCTION

Several attempts by national and international institutions have been made for poverty alleviation, but the problem persists as the most significant challenge globally. Governments and development organizations worldwide have been fighting against universal poverty since the early 2000s. The Millennium Development Goals (hereafter MDGs) formed the first global agenda to eradicate poverty and hunger by 2015 (Appiah-Effah et al., 2019). Since then, several documents have been produced; among others, the Poverty Reduction Strategy Papers (hereafter PRSPs) are the key policy documents. The

Address of Correspondence

Muhammad Yousaf
muhammad.yousaf@seecs.edu.pk

Article info

Received March 12, 2022
Accepted June 23, 2022
Published June 30, 2022

main objective of the PRSPs is to describe national strategies to promote economic growth in a broader way and poverty reduction (Tarabini & Jacovkis, 2012). The United Nations Sustainable Development Summit approved the Sustainable Development Goals (hereafter SDGs) on September 25, 2015, in New York. The SDGs have been built on the MDGs adopted in 2000. The primary motive of the SDGs is to follow the principle of not leaving anyone behind in terms of access to basic needs (McGregor, 2020). In pursuit of equality among developing and developed countries, Poverty alleviation remains the top priority in recently formed SDGs. Policymakers, experts, and researchers are still striving for strategies to alleviate poverty. Persistent efforts have been made to achieve this target worldwide irrespective of being a developed or developing country (Singh & Chudasama, 2020).

Poverty eradication is not easy, as poverty and its eradication involve multiple factors (Hassan et al., 2020; Zameer et al., 2020). As defined, “poverty is, in many ways, the worst of human deprivation. It can involve not only lack of necessities of material well-being, but also the denial of opportunities of living a tolerable life” (Anand & Sen, 1997). Thus, it can be measured by several aspects of an individual’s life (Anand & Sen, 1997). As per one of the arguments, education is a necessary tool to ensure poverty reduction (Cremin & Nakabugo, 2012). Education generates not only economic benefits such as increased remuneration, productivity, and growth but also produces social benefits related to social cohesion, political participation, fertility, and health (Tarabini & Jacovkis, 2012; Zhang 2020).

Similarly, adult skill acquisition and development (hereafter SKL) is also essential (Button et al., 2020). The terms competency and skill are used alternatively in the educational and training literature. Competency is a capacity applicable widely, while SKL is measured as a basic component of competency. Both terms involve the capacity and ability of a person to act appropriately in every situation. It entails applied knowledge and cognitive strategies along with the use of tools (DeKeyser, 2020). Among many, some of the categories of SKL are vehicle painting, business services, automotive, entertainment, information technology, primary industry, hospitality, and tourism. SKL is the central policy worldwide, especially in developing countries in this era of

competition. If the economies want to attract investment from a growth point of view, their individuals must have specific skills. (Desjardins, 2013). Moreover, as a matter of generality, the fate of unskilled youth is likely to rest in poverty (Li, 2020; Matsumoto, 2018). Now the question arises of how to acquire these skill levels without which our survival in competition is difficult. The level of SKL is a strong source of acquiring human capital in the long run. Although educational attainment has been improved, too many young people are still either unemployed or not in education and training (ILO, 2016).

Here comes the concept of Technical and Vocational Education and Training (hereafter TVET) to be one of the best sources of solutions for the issue like poverty alleviation and SKL (Khilji and Roberts, 2022; Ekhalia et al., 2021). TVET is a central feature of Goal 4 in SDGs. The term TVET was officially used at the World Congress on TVET in Seoul, the Republic of Korea, in 1999. As per the definition of UNESCO, TVET is “those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding, and knowledge relating to occupation in various sectors of economic life”. It includes all terms like vocational education, technical education, on-the-job training, vocational training, and apprenticeship. TVET programs provide all types of skills demanded in the economy like business services, IT, primary industry, and tourism, among others (Arthur-Mensah & Alagaraja, 2013; McGrath and Powell, 2016). TVET programs prepare people for work, alleviate poverty, and enhance the economic growth of a country through knowledge, attitudes, and skills (UNESCO-UNEVOC, 2015). It may be obtained either formally in trade schools, technical secondary schools, or on-the-job training programs or, more informally, by picking up the necessary skills on the job (Vinayan et al., 2020).

TVET does not only promote people's skills and knowledge needed for a country's economic development but also their capabilities (Tikly, 2013; Saeed et al., 2022). Therefore, TVET has become the government's priority for education and national development agendas (Marope et al., 2015). The major thrust of TVET is to report the issue of poverty alleviation for the current and projected challenges and opportunities

(Ohagwu et al., 2022; Adekoya, 2018). It has been observed that today, global wealth is concentrated less and less in factories, land, tools, and machinery. High-quality human capital is developed in high-quality education systems, with tertiary education providing the advanced skills that command a premium in today's workplace (World Bank, 2004; Mubanga et al., 2019). During the past four decades, only China has been committed to developing vocational education, which aims to cultivate highly skilled laborers for the country (Yang et al., 2020; Liu et al., 2020). South Korea is a perfect example of an East Asian country that has transitioned successfully from a developing to a developed country. Studies have shown that the country has designed an efficient TVET system for fast economic development in its educational system (Bhattarai, 2020; Okumu et al., 2019).

In this study, an effort has been made to examine the effect of TVET on the challenging issue of alleviating poverty in developing countries. This relationship has been analyzed through SKL. In other words, we are interested in mediation and moderation analysis. This study concludes that there exists a non-linear and negative relationship between TVET and poverty (POV). It is also observed that SKL reduces POV. Thus, the indirect effect confirms that TVET affects POV when it works through SKL. Further, the moderation analysis confirms the role of SKL in the relationship between TVET and poverty. That is, at all levels of SKL (low to high), TVET reduces POV. The study offers a fruitful way to enhance the SKL through TVET that is beneficial for the policymakers to examine the above-mentioned issue prevailing in developing countries.

2. RESEARCH METHODOLOGY

Different studies have shown how TVET is essential and effective for adult skill acquisition and development (SKL). The skilled workforce is always positioned to target employment opportunities to increase their income, resulting in poverty reduction not only in developed countries but also in developing countries. Studies show a strong relationship between vocational education and poverty alleviation. Before presenting the link between vocational education and poverty, it is pertinent to clarify both concepts. As

far as vocational education is concerned, only in English, a range of terminologies for vocational education has been found, including technical education, vocational training, technical training, on-the-job-training, occupational education, internship, apprenticeship training, skills development, vocational education, and training, technical and vocational education and training, workforce development, human resources development, and career and technical education (Maclean & Lai, 2011). We are using TVET in our study assuming that TVET is a set of practices and technologies. Different agencies and authors have defined TVET in their way. However, all definitions try to explain the study of other technologies in which one can acquire practical skills.

Similarly, poverty has been defined by many researchers in different studies. Aboyade (1987) defines it as “the insufficient or total lack of necessities and facilities like food, housing, medical care, education, social and environmental service, consumer goods, recreational opportunities, neighborhood amenities, and transport facilities.” The World Bank (2000) defines poverty using many indices in a way that poverty is “the lack of what is necessary for material well-being, especially food, but also housing, land, and other assets. In other words, poverty is the lack of multiple resources that leads to hunger and physical deprivation.”

Various studies have concluded that poverty reduction programs are beneficial for communities. For example, Adedapo and Demokun (2021) explore the relationship between skill acquisition and poverty reduction. They use primary data with a survey method in Ibadan North local government, Nigeria. They find that skill acquisition for Gele making (special cloth women use to cover their heads) is a tool for poverty reduction. They recommend establishing skill acquisition centers and special schools for vocational training at all levels. The study suggests that further research can be done to focus on other skills using an experimental design method as they have been used for Gele making.

Among the latest literature, Miller (2020) explores the relationship between TVET and poverty reduction, considering TVET as a development initiative in Cambodia. The study concludes that the students have been facilitated through training for finding employment, resulting in poverty reduction. So, the study benefits other countries with

the same structure to use different vocational programs to alleviate poverty in their regions. Choi et al. (2019) use the PIAAC¹ dataset and conduct a study on 13 countries from OECD, and 31587 individuals completed upper secondary school. The results of the study showed a higher probability of TVET graduates being employed.

TVET is a source of improving chances for youths with fewer resources, motivation, and skills for their career. Empirical evidence supports this statement when we compare the results from the TVET programs and non-TVET programs (general academic programs) in different economies (Mutambanengwe & Dambudzo 2021). Many studies have argued that TVET provides valuable skills for entering the labor market and successfully starting their professional career (Zancajo and Valiente, 2019, Moyo et al., 2022; Khan et al., 2019). Ryan (2001) also discusses the summary of the evidence taken from the seven countries of the cross-country evidence. He finds that TVET programs, especially apprenticeships have increased the opportunities for an initial working life. This is only possible because the youth have more skills due to these TVET programs.

The past few decades have seen many efforts of different researchers trying to find out how TVET affects the wages and earnings of employees. This trend ultimately becomes the source of poverty alleviation. According to a US-based study, it has been found that there are no returns from vocational schooling (Hotchkiss, 1993). He tries to find the impacts of the TVET program on wages and employment at high school levels in 1980. But opposite of this result, the students earn higher wages from the TVET programs even if they have taken less proportion of subjects of vocational education curricula (Bishop & Mane, 2004). Similarly, positive results of wages have been found by Meer (2007), although less than the results of Bishop and Mane (2004).

To see the situation regarding the discussion in the United Kingdom, the study documents that most TVET programs increase wages compared to non-TVET qualifications (Dearden et al., 2002). Dearden et al. (2004) find that a TVET course harms the earnings of those who adopted it during their employment compared to those with no qualification other than this. On the other end, Bibby et al. (2014) find that the wages are higher for individuals who have TVET programs at the workplace than those

¹ The *Programme for the International Assessment of Adult Competencies* (PIAAC) is a programme of assessment and analysis of adult skills.

who have TVET programs at the classroom level. Various studies have contributed to the data of different countries to see the impact of TVET on the earnings of employees. Researchers find results of the diverse nature of the data in other economies. For example, Oosterbeek and Webbink (2007) investigate TVET programs in the Netherlands. Pischke and von Wachter (2008) discuss Germany for the data between the 1950 and 1970s. Similarly, for Sweden, Hall (2012) investigates the impacts of the TVET policy on wages. All three studies find no effect of TVET in the Netherlands, Germany, and Sweden. However, Fersterer et al. (2008) find the same results in the TVET apprenticeship program in Austria, where there are no significant wage benefits compared to school education. But in Romania, Malamud and Pop-Eleches (2010) find that TVET graduates are more significantly likely to be employed than manual workers.

Although some studies found less or even zero responses to TVET programs, skills enhancement from TVET programs can't be denied. However, there has not been found any substantial study that has analyzed the effect on SKL since 2017. Brunello and Rocco (2017) expose the impact of TVET on SKL and labor market outcomes. They use the Program for International Assessment of Adult Skills (PIAAC) survey. The study's findings are that TVET provides slightly lesser hourly earnings, a high probability of being currently employed, and a high share of the completed working life in paid employment. They have constructed econometric models to find out the direct and indirect effects of TVET on market outcomes in the countries. However, it encourages further research in developing countries with a lot of potential to achieve positive results.

The lack of consistent policies regarding TVET becomes the primary reason for the countries' high poverty level. Governments of all economies now realize that if they want to reduce poverty on a serious note, they will have to think about human capital. So, the value of TVET has increased and there is a need to work in this area of research. The present study focuses rigorously on exploring the impact of TVET on POV through SKL in developing countries; that is, the direct and indirect effects have also been analyzed.

3. RESEARCH METHODOLOGY

This study uses annual unbalanced panel data for selected developing countries² from 1970 to 2019. There are many sources related to the study in hand that can be utilized

according to the nature of the variables. Some studies have used primary data for the analysis; however, secondary data is also available with some limitations. This study uses data on different variables from the World Development Indicators (WDI) database.

The conceptual/ theoretical framework of this research study is based on the theory of human capital which advocates that education and training increase the skill and productivity of workers and hence leads to higher wages (Becker, 1962; Mincer, 1962). Beginning from the pioneering work of Becker (1964) on investment in human capital, the theoretical literature differentiates *between general* and *firm-specific training* (on-the-job training). Becker (1964) argues that when labor markets are competitive, firms prefer to invest in specific training rather than general training. However, in case of imperfect competition, such distinctions may not be relevant. Given that TVET is a type of training that is provided at schools, colleges, and other technical institutions, we could apply Becker's (1964) framework to vocational education and training.

Based on the above-mentioned theoretical framework, this study investigates the impact of TVET on POV through SKL. Further, we study the moderating role of SKL for the impact of TVET on POV. For this, we use Hayes and Preacher's (2014) approach and construct the following econometric model.

$$SKL_{it} = \alpha_1 + \alpha_2 TVET_{it} + \alpha_3 TVET_{it}^2 + u_{it} \quad (1)$$

$$POV_{it} = \beta_1 + \beta_2 TVET_{it} + \beta_3 TVET_{it}^2 + \beta_4 SKL_{it} + \beta_5 Z_{it} + \varepsilon_{it} \quad (2)$$

For moderation analysis, we use the following specification.

$$POV_{it} = \gamma_1 TVET_{it} + \gamma_2 SKL_{it} + \gamma_3 (TVET * SKL)_{it} + \gamma_4' X_{it} + \mu_i + \varepsilon_{it} \quad (3)$$

Where SKL is adult skill acquisition. TVET is technical and vocational education and training measured by the number of secondary students enrolled in technical and vocational education programs, including teacher training. TVET2 (hereafter TVET_SQ) is the squared term of TVET. POV is poverty measured by

² List of countries is available in Appendix A

the poverty headcount ratio at \$1.9 a day (2011 PPP, % of the population). Z is the vector of control variables such as inflation (INF) and financial development (FD). Terms u_i and ε_{it} are stochastic error terms. TVET * SKL is the interaction term. X is the vector of control variables, such as income inequality (INQ) and real per capita Gross Domestic Product (RPCGDP). We include INQ to incorporate the effect of income inequality, as inequality increases poverty. To incorporate the overall economic development in the economy we include RPCGDP.

Equations 1 and 2 are a system of equations solved simultaneously. We estimate this system of equations by employing the Seemingly Unrelated Regression method for unbalanced panel data developed by Biorn (2004). The method utilizes the random effects technique with GLS/ ML estimation. The advantage of this method is that it controls heterogeneity and avoids the problem of biasedness at the country level (Biorn, 2004; Baltagi, 2005; Demirdogen et al., 2016).

After the estimation of equations 1 and 2, we compute the conditional direct and indirect effects of TVET on poverty as follows:

Conditional direct effect

$$\frac{\partial \text{POV}}{\partial \text{TVET}} = \beta_2 + 2\beta_3 \text{TVET}$$

Conditional indirect effect

The indirect effect of TVET on POV through SKL is calculated from equations (1) and (2) as follows:

$$\frac{\partial \text{POV}}{\partial \text{TVET}} = \frac{\partial \text{SKILL}}{\partial \text{TVET}} \times \frac{\partial \text{POV}}{\partial \text{SKILL}} = (\alpha_2 + 2\alpha_3 \text{TVET})(\beta_4)$$

Moreover, for the moderation analysis, we employ the Fixed Effect estimator suggested by Hausman (1978) test to estimate equation (3). From the estimated equation (3), we compute the conditional or moderation effect as follows,

$$\frac{\partial \text{POV}}{\partial \text{TVET}} = \gamma_1 + \gamma_3 \text{SKL}$$

Equation (1) shows that the impact of TVET on POV is conditional on the levels of SKL.

4. GRAPHICAL ANALYSIS

In Figure 1, we plot POV and TVET, the plot confirms that as the level of TVET increases, initially, POV rises then after some level of TVET it starts to decline. It explains that there exists a non-linear relationship between TVET and POV. Initially as TVET increases, the expense of getting technical education increases. A person already experiencing poverty when paying additional expenses becomes poorer; therefore, poverty increases. After acquiring technical knowledge, he becomes a skillful person, and his income increases, hence poverty reduces.

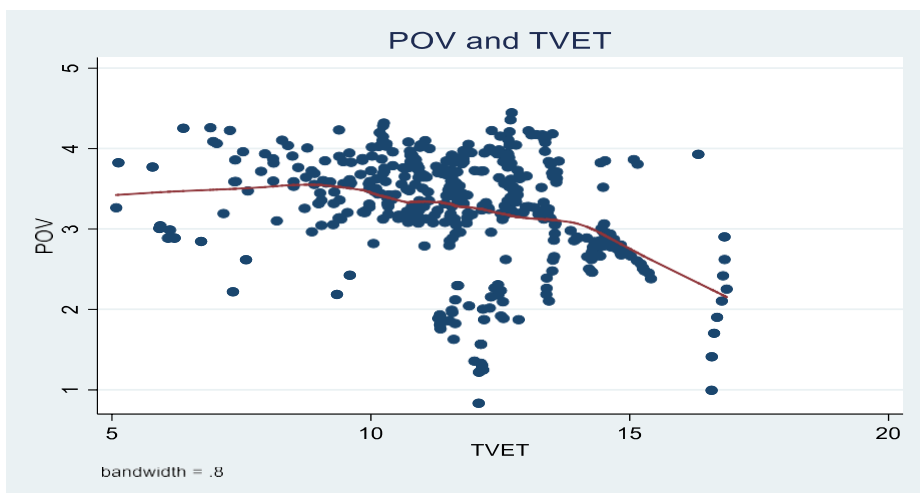


Figure 1. Relationship between POV and TVET

In Figure 2, we plot POV and SKL, the plot confirms that as the level of SKL acquisition increases the POV declines which shows the negative relationship between POV and SKL acquisition. It confirms the conceptual framework that explains the logic. According to this logic, skilled people get more opportunities for better jobs. As a result, the people receive higher wages due to their skills, thus reducing poverty.

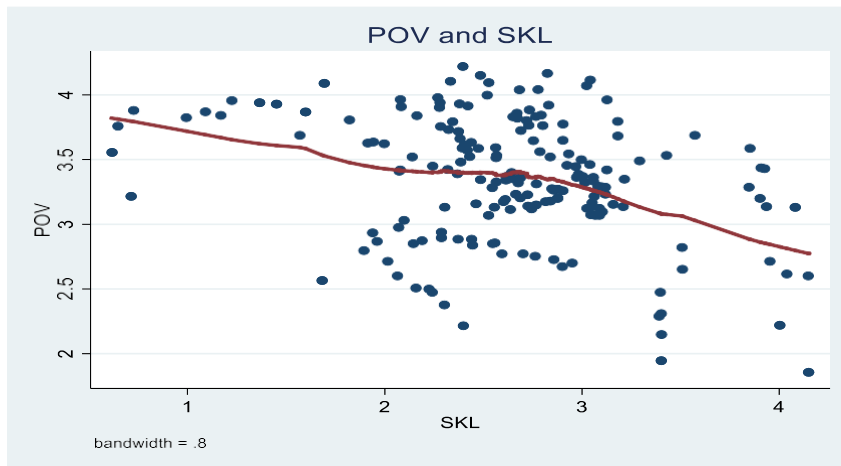


Figure 2. Relationship between POV and SKL

In Figure 3, we plot TVET and SKL, the figure confirms that as the TVET increases, there is an improvement in SKL. However, after attaining a certain optimum level of TVET, SKL starts to decline slightly. It shows that, overall, there is a positive relationship between SKL and TVET. Additionally, more technical training creates skilled labor. However, in countries where the people are already skilled, TVET is not showing a positive relation due the market saturation. It shows somehow stability of skill with increasing the TVET.

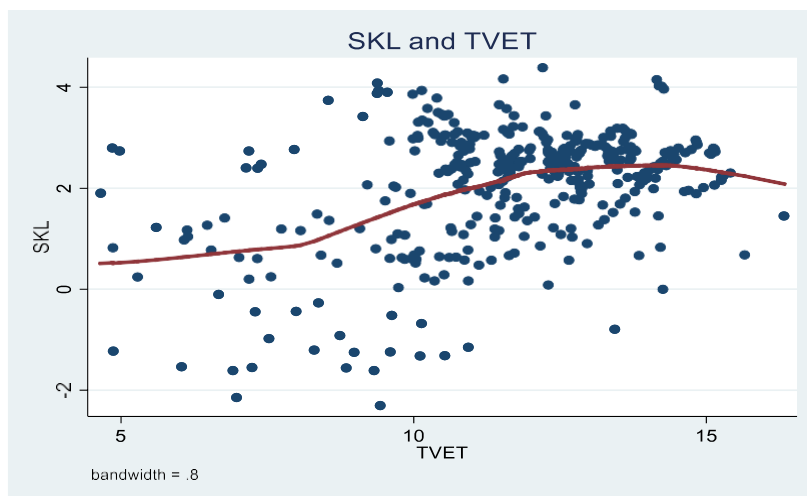


Figure 3. Relationship between Skill and TVET

The above graphical analysis strengthens our theoretical framework for mediation and moderation analyses.

5. DESCRIPTIVE ANALYSIS

Table 1 encompasses the summary statistics, whereas Table 2 includes the correlation matrix. Table 1 shows the total number of observed cases (N), mean, median, standard deviation (SD), minimum values (Min), and maximum values (Max) for POV, SKL, TVET, FD, INF, INQ, and EG respectively. Regarding our variable of interest, the TVET obtains the highest mean value of 10.137, and INF shows the highest mean value of 64.623 among the control variables. In addition, FD shows the lowest mean value of 2.916. The rest of the mean values for POV, adult skill, INQ, and EG are 3.281, 4.288, 3.716, and 7.541 respectively.

Table 1. Summary Statistics						
Variables	N	Mean	Median	SD	Min	Max
POV	636	3.281	3.352	0.630	0.470	4.434
SKL	585	4.288	4.422	0.356	2.808	4.605
TVET	3541	10.137	10.138	2.394	2.398	16.867
FD	4946	2.916	2.986	0.885	-1.093	5.115
INF	4453	64.623	56.829	100.396	0.000	4583.706
INQ	1009	3.716	3.721	0.218	3.178	4.187
RPCGDP	5408	7.541	7.592	0.993	5.086	9.882

The table also depicts the highest value of the median for INF 56.829 and the lowest value for FD 2.986 respectively. We also note that INF has the highest volatility measured by the standard deviation (SD).

Table 2 shows that there is a negative correlation between POV and SKILL with the value of correlation coefficient -0.176. It is exactly what we have discussed in our conceptual framework in section 4 of this study. According to this observation, if the employees are more equipped with a skill level, they will have more opportunities for skilled employment with more earnings. This results in decreasing poverty because of more income levels. Similarly, there is a negative correlation of POV with our variable of interest TVET having the value of correlation coefficient of -0.022. It is also exactly in line with the conceptual framework that TVET is strongly beneficial for alleviating

poverty. Employees with more TVET levels will be getting more rewards in the shape of wages that result in employee well-being, commonly known as decreasing poverty.

Table 2. Correlation Matrix							
Variables	POV	SKL	TVET	FD	INF	INQ	RPCGDP
POV	1.000						
SKL	-0.176	1.000					
TVET	-0.022	0.206	1.000				
FD	-0.501	0.301	0.265	1.000			
INF	-0.488	0.196	0.154	0.232	1.000		
INQ	0.293	0.053	0.262	0.175	-0.465	1.000	
RPCGDP	-0.369	0.419	0.358	0.661	0.086	0.377	1.000

Additionally, the correlation of POV with FD, INF, and EG is observed with the values of correlation coefficient -0.501, -0.488, and -0.369 respectively. However, there is a positive association between POV and INQ which is 0.293. Moreover, the positive correlation of adult skill is observed with TVET, FD, INF, INQ, and EG depicting the coefficient values 0.206, 0.301, 0.196, 0.053, and 0.419 respectively. Furthermore, a similar trend of positive correlation of TVET is observed with FD, INF, INQ, and EG showing the values 0.265, 0.154, 0.262, and 0.358 respectively.

6. THE IMPACT OF TVET ON POV THROUGH SKL

In this section, we analyze the relationship between TVET and POV while discussing the role of SKL as a mediator by employing the seemingly unrelated regression method for unbalanced panel data as suggested by Biorn (2004).

Table 3 explains our regression results for the impact of TVET on POV through SKL. Our model contains two equations. Model (1a) represents the estimation results of the mediating equation, whereas model (1b) represents the estimation results of our main equation. The dependent variable in the model (1a) is SKL, a proxy for adult skill acquisition and development, and POV to proxy poverty in model (1b). The explanatory variables are TVET and TVET square term (TVET_SQ) in models (1a) and (1b) of Table 1. We use TVET_SQ because our data supports non-linearity, as shown in Figure 1.

In our mediation equation, model (1a), the TVET elasticity of SKL is positive and significant. It means that a one percent increase in technical education and training results

in an increase in SKL by 0.732 percent. It crystallizes that the TVET improves SKL. The result is consistent with the previous literature (Miller, 2020; Adedapo & Demokun, 2021; Xu & Sun, 2021). Similarly, the TVET_SQ elasticity of SKL is negative and significant. It implies that a higher level of TVET ultimately deteriorates SKL due to market saturation mentioned in section 4.

Table 3. Impact of TVET on POV through SKL		
	Model 1	
	(a)	(b)
Variables	SKL	POV
SKL		-0.150*** (0.000)
TVET	0.732*** (0.000)	0.724*** (0.000)
TVET_SQ	-0.041*** (0.000)	-0.030*** (0.000)
INF		0.013*** (0.000)
FD		-0.501*** (0.000)
	Direct Conditional Effect	Indirect Effect
Low TVET (25th percentile)	0.013 (0.765)	-0.003*** (0.001)
Median TVET (50th percentile)	-0.115** (0.011)	0.016*** (0.000)
High TVET (75th percentile)	-0.260*** (0.000)	0.038*** (0.000)
Number of Observations	150	150
Number of Countries	129	129
Note. *, **, and *** indicate the significance level at 10%, 5% and 1%, respectively, p-value appears in parentheses. The dependent variables are the SKL and POV. TVET, TVET_SQ, and SKL are the main independent variables. FD is financial development. INF is inflation. All variables are in log form.		

Else ways, in the main equation, model (1b), the TVET elasticity of POV is positive. It implies that a one percent improvement in TVET enhances poverty (POV) by 0.724 percent. It elucidates that initially when people decide to improve their skills by investing in education and training activities, poverty enhances because people start to get some education which initially does not contribute to their earnings and the poor become

poorer. As discussed in the graphical analysis there exists non-linearity in the relationship between TVET and POV. That is why we include the squared term of TVET. The TVET_SQ elasticity of POV is negative and significant. It confirms that after achieving a certain level of education and training, poverty starts to decline. Our result is consistent with the empirical findings of Choi et al. (2019) and Wu (2020). Additionally, the POV's elasticity of adult skill is negative and significant. It entails that improving adult skills reduces poverty. This result is like Hadi et al. (2013) and Qin et al. (2019). The results imply that people having high skills are targeted by the labor market immediately as per their learned expertise. Therefore, this causes an attractive increase in their wages and decreases poverty in developing countries.

This study explores the mediation of SKL for the impact of TVET on POV. That is why we compute the direct and indirect effects. However, in this case, we do not observe the direct effect because of the squared term of TVET as discussed above. That is why we compute the direct conditional effects by taking the partial derivative of equation (2), presented in the lower panel of Table 3. For this, we use three levels of TVET: low (25th percentile), median (50th percentile), and high (75th percentile). At a lower level of TVET, the coefficient is positive but insignificant. However, as the level of TVET increases, the coefficient becomes negative and highly significant. It implies that the level of TVET helps to reduce POV. Further, we compute the indirect effect by taking the derivative of equations (1) and (2) and we use the same three levels of TVET as discussed above. The results of indirect effects are also presented in the lower panel of Table 3. At a low level of TVET, the direct conditional effect is insignificant and positive. However, the indirect effect is negative and significant. It means that partial mediation exists. It clarifies that TVET reduces POV when it works through SKL at a low level of education and training. The results of the study are consistent with previous studies like Gvaramadze (2010), Brunello and Rocco (2017), and Miller, (2020).

On the contrary, at average and high levels of TVET, the direct conditional effect is negative and significant, as shown in Table 3, whereas the indirect effects are positive and significant. The significant coefficients of indirect effect confirm the partial mediation of SKL, however, with a positive sign. It implies that, as the level of TVET

improves and reaches some median and high level, TVET enhances POV when it works through SKL. This fact is surprising and hard to interpret. As we discussed earlier, TVET and POV hold a non-linear relationship. The reason behind this in current population settings is that more technical training creates skilled labor; however, in countries where the people are already skilled, TVET is not showing a positive relation due the market saturation. This market saturation does not create more opportunities for the people to make them able to earn better wages and contribute significantly to poverty reduction. Nevertheless, it shows somehow stability of skill with increasing the TVET.

As discussed earlier, we employ various control variables in both columns of the model (1). The impact of INF on POV is positive and significant. It elaborates that when the price level increases by one unit, POV is enhanced by less than one unit. It happens because inflation disturbs purchasing power, resulting in poverty enhancement. Moreover, the FD elasticity of POV is negative and significant. It clarifies that financial development in the country reduces poverty. The results support the hypothesis that financial development creates more comfortable and accessible opportunities for finances and their management. Resultantly, financial development leads to a step toward the well-being and betterment of the members of society.

7. THE ROLE OF SKL IN THE IMPACT OF TVET ON POV

In this section, we analyze the moderating role of SKL in the relationship between TVET and POV using the fixed effect method. The results are provided in Table 4.

Table 4 shows that the impact of TVET on POV is negative and significant at a 1% level. It implies that technical vocational education and training reduce poverty. This result is in line with Miller (2020), Adedapo and Demokun (2021), and Xu and Sun (2021). Additionally, the SKL elasticity of POV is negative and significant. It crystallizes that improved adult skill helps in poverty reduction. We include the interaction of TVET and SKL (TVET*SKL). The TVET*SKL elasticity of POV is positive and significant. It confirms that the level of adult skill outperforms poverty reduction (Xu & Sun, 2021).

The relationship between INF and POV is positive but insignificant. Besides, the INQ elasticity of POV is positive and significant, which entails that poverty grows as

there is more inequality in the economy. An increase in overall economic prosperity in the country alleviates poverty as indicated by the negative POV's elasticity of RPCGDP. Moreover, we employ FD to investigate the impact of financial development on poverty reduction. The FD elasticity of EG is negative but insignificant.

Table 4. The Role of SKL in the impact of TVET on POV	
Variables	Dependent variable POV
SKL	-2.007*** (0.001)
TVET	-0.497*** (0.008)
TVET*SKL	0.171*** (0.001)
INF	0.001 (0.646)
INQ	0.526** (0.022)
RPCGDP	-1.173*** (0.000)
FD	-0.11 (0.349)
Constant	17.607*** (0.000)
Number of Observations	140
Number of PID	33
R-squared	0.834
Note. As for Table 3. TVET*SKL is the interaction between TVET and SKL. INQ is income inequality. RPCGDP is real per capita GDP. *, **, and *** indicate the significance level at 10%, 5% and 1%, respectively, p-value appears in parenthesis.	

As discussed, we are interested in the moderating role of SKL. Table 4 encompasses the conditional effects of the coefficient of TVET*SKL is significantly positive which is why we compute the conditional effects at three different levels of SKL: low, median, and high. At a low level of SKL, the conditional effect is negative and significant. It implies that whenever there is a low level of skill, it helps to reduce poverty. Whereas, at a high and median level of skill the conditional effect is negative and insignificant.

Conditional Effects			
	Coefficient	95% Confidence Interval	
Low SKILL (25th percentile)	-0.252**	-0.473	-0.032
	(0.025)		
Median SKILL (50th percentile)	-0.089	-0.238	0.060
	(0.243)		
High SKILL (75th percentile)	-0.017	-0.141	0.107
	(0.784)		

8. CONCLUSION

This study addresses the importance of the TVET policy which seems fruitful to strengthen the economy with capable, qualified, and competitive personnel. In this regard, the aim is to train people to participate in poverty reduction and sustainable growth. In addition, to strengthen national development, it is very important to assess the TVET policy from time to time. Many economies are now much interested in expanding TVET programs and arrangements for young people, at all levels in tertiary as well as upper-secondary, to handle youth unemployment. Skill acquisition is the central policy in all developing countries in this era of competition. There is a need for individuals in these economies to have certain skills level if they want to attract investment from the growth point of view (Desjardins, 2013). Moreover, skill level is a strong source of acquiring human capital in the long run. Therefore, the current study investigates the impact of TVET on the challenging issue of alleviating poverty considering the mediating and moderating roles of adult skills in developing countries.

The findings of the study affirm that a significant negative nonlinear relationship between TVET and POV is observed in the analysis. Moreover, in the mediation equation, the relationship between TVET and SKL is significantly positive which confirms that TVET improves SKL. Similarly, the TVET_SQ impact on SKL is negative and significant. It implies that a higher level of TVET ultimately deteriorates poverty due to the availability of more opportunities for employment and earnings. Contrarily, in the main equation, the TVET's impact on POV is positive. It elucidates that initially when people decide to improve their skills by investing in education and training activities, poverty enhances because people start to get some education which initially does not

contribute to their earnings and the poor become poorer.

Furthermore, as there exists nonlinearity in the relationship, the TVET_SQ impact on POV is negative and significant. It confirms that after achieving a certain level of education and training poverty starts to decline. Additionally, the relationship between SKL and POV is negative and significant entailing that improving adult skills reduces poverty. Our results confirm the presence of partial mediation of SKL that is TVET affects POV when it works through SKL. The results show that at initial levels of TVET, SKL starts to improve, and poverty reduces. However, for an average and high level of TVET, the indirect effect confirms that TVET enhances POV. The reason behind this in current population settings is that more technical training creates skilled labor; however, in countries where the people are already skilled, TVET is showing a positive impact due to market saturation. This market saturation does not create more opportunities for the people to make them able to earn better wages and contribute significantly to poverty reduction. Nevertheless, it shows somehow stability of skill with increasing the TVET.

Further, this study explores the moderation of SKL for the impact of TVET on POV. The results show that TVET reduces POV. Similarly improved SKL alleviates POV as indicated by the negative impact of TVET on POV and SKL on POV. However, the TVET*SKL impact of POV is positive and significant. It clarifies that as the level of SKL improves TVET enhances POV. The TVET*SKL impact on POV is significant, so we compute the conditional effects using three levels of SKL: low, median, and high. At a low level of SKL, the conditional effect is negative and significant, whereas, at a high and median level of SKL, the conditional effect is negative and insignificant.

Concluding, it is observed that the increasing trend of TVET encourages employees in terms of better opportunities for earning, which ultimately results in fascinating rewards and wages. This will lead to a high employment rate due to the impact of TVET and reducing poverty in developing countries. The study suggests that developing countries encourage concerned sectors to enhance technical and vocational education programs. This will strengthen youth in terms of skill demand in their society and will be increasing their earnings for achieving the target of poverty alleviation.

REFERENCES

- Aboyade, O. (1987). *Integrated Economies: A Study of Developed Economies*. London. Advisor Wesley Publishers.
- Adedapo, A. A., & Demokun, B. O. (2021). Skill acquisition as a tool for poverty reduction in Ibadan north local. *International Journal of Economic and Business Review* (9)7, 1-15.
- Adekoya, O. D. (2018). Impact of human capital development on poverty alleviation in Nigeria. *International Journal of Economics & Management Sciences*, 7(4), 1-8.
- Anand, S., & Sen, A. (1997). Concepts of human development and poverty! A multidimensional perspective. *United Nations Development Programme, Poverty and Human Development: Human Development Papers*, 1-20.
- Appiah-Effah, E., Duku, G. A., Azangbego, N. Y., Aggrey, R. K. A., Gyapong-Korsah, B., & Nyarko, K. B. (2019). Ghana's post-MDGs sanitation situation: an overview. *Journal of Water, Sanitation and Hygiene for Development*, 9(3), 397-415.
- Arthur-Mensah, N., & Alagaraja, M. (2013). Exploring technical vocational education and training systems in emerging markets: A case study on Ghana. *European Journal of Training and Development*, 37(9), 835-850.
- Baltagi, B. H. (2005). *Econometrics Analysis of Panel Data* (3rd ed.). England: Jhon Wiley & Sons.
- Becker, G. S. (1962). Investment in human capital: A theoretical analysis. *Journal of Political Economy*, 70(5), 9-49.
- Becker, G. S. (1964). *Human Capital: A Theoretical and Empirical Analysis*. New York: Columbia University Press.
- Bhattarai, P. C. (2020). Technical and vocational education and training (TVET): What Next?. *International Journal of Multidisciplinary Perspectives in Higher Education*, 5(1), 106-112.
- Bibby, D., Buscha, F., Cerqua, A., Thomson, D. & Unwin, P., (2014). Estimation of the labour market returns to qualifications gained in English further education. Department for Business Innovation & Skills, BIS Research Paper Number 195.
- Biorn, E. (2004). Regression systems for unbalanced panel data: A stepwise maximum likelihood procedure. *Journal of Econometrics*, 122(2), 281-291.
- Bishop, J. H. & Mane, F. (2004). The impacts of career-technical education on high school labour market success. *Economic Education Review*, 23(4):381-402.
- Brunello, G., & Rocco, L. (2017). The effects of vocational education on adult skills, employment, and wages: What can we learn from PIAAC? *SERIES*, 8(4), 315-343.
- Button, C., Seifert, L., Chow, J. Y., Davids, K., & Araujo, D. (2020). *Dynamics of skill acquisition: An ecological dynamics approach*. Human Kinetics Publishers.
- 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, 129-138.
- Cremin, P., & Nakabugo, M. G. (2012). Education, development and poverty reduction: A literature critique. *International Journal of Educational Development*, 32(4), 499-506.
- Dearden, L., McGranahan, L., & Sianesi, B. (2004). *An in-depth analysis of the returns to national vocational qualifications obtained at level 2*. Centre for the Economics of Education, London.
- Dearden, L., McIntosh, S., Myck, M., & Vignoles, A. (2002). *The returns to academic and*

- vocational qualifications in Britain. *Bulletin of Economic Research*, 54(3), 249-274.
- DeKeyser, R. (2020). *Skill acquisition theory*. In *Theories in second language acquisition* (pp. 83-104). Routledge.
- Demirdogen, A., Olhan, E., & Chavas, J.-P. (2016). Food vs. fiber: An analysis of agricultural support policy in Turkey. *Food Policy*, 61, 1-8.
- Desjardins, R., Thorn, W., Schleicher, A., Quintini, G., Pellizzari, M., Kis, V., & Chung, J. E. (2013). *OECD skills outlook 2013: First results from the survey of adult skills*. *Journal of Applied Econometrics*, 30(7), 1144-1168.
- Ekhalia, B. J., Kareem, W. B., Abubakar, H. O., Onuh, J., & Ekele, O. A. (2021). TECHNICAL VOCATIONAL EDUCATION AND TRAINING (TVET): A VIABLE STRATEGY FOR POVERTY ALLEVIATION IN NIGERIA. *International Journal of Vocational Education & Training*, 26(3).
- Fersterer, J., Pischke, J. S., & Winter-Ebmer, R. (2008). Returns to apprenticeship training in Austria: Evidence from failed firms. *Scandinavian Journal of Economics*, 110(4), 733-753.
- Gvaramadze, I. (2010). Low-skilled workers and adult vocational skills-upgrading strategies in Denmark and South Korea. *Journal of Vocational Education & Training*, 62(1), 51-61.
- Hadi, M. Y. A., Roddin, R., Razzaq, A. R. A., Mustafa, M. Z., & Abd Baser, J. (2013). Poverty eradication through vocational education (tourism) among indigenous people communities in Malaysia: Pro-poor tourism approach (PPT). *Procedia-Social and Behavioral Sciences*, 93, 1840-1844.
- Hall, C. (2012). The effects of reducing tracking in upper secondary school evidence from a large-scale pilot scheme. *Journal of Human Resources*, 47(1), 237-269.
- Hassan, M. S., Bukhari, S., & Arshed, N. (2020). Competitiveness, governance and globalization: What matters for poverty alleviation?. *Environment, Development and Sustainability*, 22(4), 3491-3518.
- Hausman, J. A., (1978). Specification Tests in Econometrics. *Econometrica*, 46(6), 1251-1271.
- Hayes, A. F., & Preacher, K. J. (2014). Statistical mediation analysis with a multicategorical independent variable. *British Journal of Mathematical and Statistical Psychology*, 67(3), 451-470.
- Hotchkiss, L. (1993). Effects of training, occupation, and training-occupation match on wage. *Journal of Human Resources*, 28(3):482-496
- International Labor Organization ILO (2016), "Technological changes and work in the future", available at: https://www.ilo.org/global/topics/future-of-work/WCMS_534201/lang-en/index.htm.
- Khan, M. Y., Alvi, A. K., & Chishti, M. F. (2019). An Investigation on The Linkages Between Poverty and Education: A Statistical Review. *Gomal University Journal of Research*, 35(1), 44-53.
- Khilji, N. K., & Roberts, S. A. (2022, March). Soft skills acquisition for the knowledge economy: a research strategy for policy evolution in technical and vocational education and training (TVET) in intermediate and emergent economies. In *Eurasian Business and Economics Perspectives: Proceedings of the 34th Eurasia Business and Economics Society Conference* (pp. 379-398). Cham: Springer International Publishing.
- Li, J. (2020). Join the fight against poverty: utilizing HRD practices to support pathways to sustainable employment and decent work. *Human Resource Development*

- International*, 23(1), 1-4.
- Liu, M., Feng, X., Wang, S., & Qiu, H. (2020). China's poverty alleviation over the last 40 years: Successes and challenges. *Australian Journal of Agricultural and Resource Economics*, 64(1), 209-228.
- Maclean, R., & Lai, A. (2011). The future of technical and vocational education and training: Global challenges and possibilities. *International Journal of Training Research*, 9(1-2), 2-15.
- Malamud, O., & Pop-Eleches, C. (2010). General education versus vocational training: Evidence from an economy in transition. *The Review of Economics and Statistics*, 92(1), 43-60.
- Marope, P. T. M., Chakroun, B., & Holmes, K. P. (2015). *Unleashing the potential: Transforming technical and vocational education and training*. UNESCO Publishing.
- Matsumoto, M. (2018). Technical and vocational education and training and marginalised youths in post-conflict Sierra Leone: Trainees' experiences and capacity to aspire. *Research in Comparative and International Education*, 13(4), 534-550.
- McGrath, S., & Powell, L. (2016). Skills for sustainable development: Transforming vocational education and training beyond 2015. *International Journal of Educational Development*, 50, 12-19.
- McGregor, E. (2020). Migration, the MDGs, and SDGs: Context and complexity 1. In *Routledge Handbook of Migration and Development* (pp. 284-297). Routledge.
- Meer, J. (2007). Evidence on the returns to secondary vocational education. *Economics of Education Review*, 26(5), 559-573.
- Miller, A. (2020). Development through vocational education: The lived experiences of young people at a vocational education, training restaurant in Siem Reap, Cambodia. *Heliyon*, 6(12), e05765.
- Mincer, J. (1962). On-the-job training: Costs, returns, and some implications. *Journal of Political Economy*, 70(5), 50-79.
- Moyo, C., Mishi, S., & Ncwadi, R. (2022). Human capital development, poverty and income inequality in the Eastern Cape province. *Development Studies Research*, 9(1), 36-47.
- Mubanga, P., Hock, O. Y., Asif, M. K., & Mulenga, I. M. (2019). Methods of financing technical and vocational education and training, and entrepreneurship education to support skills development in Lusaka Province, Zambia. *International Journal of Research and Scientific Innovation (IJRSI)*, 4(4), 96-107.
- Mutambanengwe, B. K., & Dambudzo, I. I. (2021). Employment Creation and Extreme Poverty Eradication through Open and Distance eLearning and Technical-Vocational Education and Training in Zimbabwe. *International Journal of Distance Education and E-Learning*, 6(2), 1-14.
- Nguyen, M. (2010). XTSUR: Stata module to estimate seemingly unrelated regression model on unbalanced panel data. *Statistical Software Components*, Boston College Department of Economics.
- Ohagwu, O., Nwanesi, P. K., & Bala, P. (2022). Skill acquisition (TVET) and employment in Sarawak. *International Social Science Journal*, 72(243), 145-157.
- Okumu, I. M., & Bbaale, E. (2019). Technical and vocational education and training in Uganda: A critical analysis. *Development Policy Review*, 37(6), 735-749.
- Oosterbeek, H., & Webbink, D. (2007). Wage effects of an extra year of basic vocational education. *Economics of Education Review*, 26(4), 408-419.
- Pischke, J. S., & Von Wachter, T. (2008). Zero returns to compulsory schooling in

- Germany: Evidence and interpretation. *The Review of Economics and Statistics*, 90(3), 592-598.
- Qin, D., Xu, H., & Chung, Y. (2019). Perceived impacts of the poverty alleviation tourism policy on the poor in China. *Journal of Hospitality and Tourism Management*, 41, 41-50.
- Ryan, P. (2001). The school-to-work transition: A cross-national perspective. *Journal of Economic Literature*, 39(1), 34-92.
- Saeed, M., Gull, M., & Altaf, F. (2022). Effectiveness of Technical and Vocational Education: A Meta-Analysis. *Pakistan Journal of Educational Research and Evaluation (PJERE)*, 10(1).
- Singh, P. K., & Chudasama, H. (2020). Evaluating poverty alleviation strategies in a developing country. *PloS one*, 15(1), e0227176.
- Tarabini, A., & Jacovkis, J. (2012). The poverty reduction strategy papers: An analysis of a hegemonic link between education and poverty. *International Journal of Educational Development*, 32(4), 507-516.
- Tikly, L. (2013). *Reconceptualizing TVET and development: a human capability and social justice approach*. UNESCO-UNEVOC International Centre for Technical and Vocational Education and Training, UN Campus.
- UNESCO-UNEVOC (2015). *Global Forum Report: Global Forum on Skills for work and life: post 2015, 14–16 October 2014, Bonn, Germany*. UNESCO-UNEVOC, Bonn.
- Vinayan, G., Harikirishanan, D., & Ling, S. M. (2020). Upskilling and reskilling the workforce via industry driven technical and vocational education and training: Strategies to initiate Industry/Institution partnership in Malaysia. *Journal of Economic Info*, 7(2), 94-103.
- World Bank, (2004). *Skills Development in Sub-Saharan Africa*. Washington, DC.
- World Bank. (2000). *World Development Report 2000/2001: Attacking Poverty*. The World Bank.
- Wu, J. (2020). Research on the performance assessment mechanism of accurate poverty alleviation in vocational education. *Journal of Finance Research* (4)2, 1-7.
- Xu, C., & Sun, Y. (2021). Mechanism of vocational education promoting precision poverty alleviation. *The International Journal of Electrical Engineering & Education*, 1-17.
- Yang, Y., de Sherbinin, A., & Liu, Y. (2020). China's poverty alleviation resettlement: Progress, problems and solutions. *Habitat International*, 98, 102135.
- Zameer, H., Shahbaz, M., & Vo, X. V. (2020). Reinforcing poverty alleviation efficiency through technological innovation, globalization, and financial development. *Technological Forecasting and Social Change*, 161, 120326.
- Zancajo, A., & Valiente, O. (2019). TVET policy reforms in Chile 2006–2018: between human capital and the right to education. *Journal of Vocational Education & Training*, 71(4), 579-599.
- Zhang, L. (2020). Overview of the poverty-alleviation by supporting education in China. *Sci Insigt Edu Front*, 6(2), 631-651.