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The Philippine Review of Economics

Who benefits from Dual Training Systems? Evidence from the Philippines

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Rising youth unemployment rates have been increasingly recognized as a serious challenge in developing and advanced economies, suggesting a potential skills gap between the demand and supply of recent graduates. Effective dual education programs which utilize a combination of classroom instruction and practical skill training are usually presented as an approach to develop a skilled workforce and meet employers' demands. This paper analyzes data from a recent survey tracking graduates from the Philippines' Dual Training System (DTS), as well as from regular programs provided by technical vocational training institutes. The evidence suggests that the DTS has a significantly higher rate of returns on labor market earnings than regular, classroom-only vocational training programs, particularly among high school graduates who did not perform well academically during basic education. The magnitude of the impact of the DTS is also likely to increase in correlation with the intensity of the on-the-job component.

1. Introduction

Rising youth unemployment rates have been increasingly recognized as a serious challenge in both developing and advanced economies, as the trend indicates a potential skills gap between workforce demands and recent graduates. Governments across the world have fostered and implemented a variety of policies to try to bridge this gap. Among them is the provision of subsidized workforce training.

While the provision of education contributes to the accumulation of general human capital, training in the workplace is designed to equip workers with

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specific job competencies (Becker [1962]; Mincer [1962]). When particularly skilled workers are not readily available from the labor market, companies must train current employees and source trainable new hires to develop their own human capital specific to their needs. Indeed, transitioning from school and vocational training to the workforce often requires developing appropriate hard and soft skills, which can take place through on-the-job training (OJT), apprenticeships, and other vocational programs. These transitional programs are typically implemented in companies where new employees can acquire critical skills, knowledge, and behaviors by working alongside experienced workers or trainees. Globally, studies demonstrate generally high returns to OJT in private firms (Bartel [1995]; Blundell et al. [1996]; Loewenstein and Spletzer [1999]; Booth et al. [2003]; Booth and Brian [2007]; Lynch [1992]; and Veum [1995]).

This paper evaluates the experience of a particular type of subsidized workforce training involving OJT, known as the dual training system (DTS) which originated in Germany. In the DTS, trainees build practical skills through OJT at companies while acquiring relevant theoretical knowledge at vocational training institutions. Since its initial application in Germany and other European countries, with time, many developing countries have shown an increasing interest in applying these types of programs for workforce training, with limited knowledge on their actual impact and applicability in these settings, as well as in its cost-benefit [Lee et al. 2016]. Indeed, while OJT or firm-level (or enterprise-based) training appears critical for industrial development in developed countries, identifying returns to such training is rare in developing country contexts (Schaffner [2001]; Yamauchi et al. [2009]; and Sekkat [2011]).

One of the developing countries that followed the DTS approach is the Philippines, and this paper analyzes the impact it has had on its graduates once they transition into the labor market. The Philippine case is interesting not only given the size of its youth labor market, but also because youth idleness, a term referring to young people who are neither employed, nor enrolled in education, nor in a training program, is among the highest in the world, applying to one in every four persons ages 15–24 in the Philippines [Rutkowski et al. 2016]. Similarly, there is manifested unsatisfaction from employers on the readiness of youngsters once they enter the labor market: the number of employers reporting difficulties hiring workers with relevant workforce skills has increased by 30 percent in the past six years, particularly among growing, innovative, and large-scale firms in the country [Acosta et al. 2017].

Originally adopted from the German model, the Philippine DTS was introduced in the 1980s through a joint project of the Southeast Asian Science Foundation and the Hans Seidel Foundation. After its debut in the Dualteach Training Center, the program's success led to a nationwide expansion in 1991. The Technical Education and Skills Development Authority (TESDA) is mandated to promote, coordinate, and administer the DTS as a form of enterprise-based technical and vocational education training (TVET).

Recent studies suggest significant premiums for enterprise-based training in the Philippines. The employment rate of enterprise-based training (including DTS) graduates has been consistently highest among all training modalities under TESDA (Di Gropello et al. [2010] and Orbeta and Esguerra [2016]). Moreover, a cost-benefit study found net benefits for firms offering the DTS programs relative to the direct costs incurred from program implementation [Mapa et al. 2016]. The same study also suggested differences in long-term productivity between the DTS-trained workers and non-DTS-trained workers, but did not estimate empirically such claim.

This study analyses the labor market returns to the DTS program in the Philippines by using tracking survey data provided by technical and vocational institutes (TVIs) in the country. The paper also analyses the differences in labor market outcomes between the DTS and regular program (RP) graduates from the same TVIs, without categoric implications of causal impacts considering randomized-control trial methods are not possible with the available data.

This paper is divided into six sections. The second section provides an overview of the Philippine DTS. The third section describes the analytical approach used to estimate the rate of private returns to the DTS. The fourth section details the tracking survey and samples. The fifth section examines the results of returns to the DTS, and the sixth section presents the conclusions of the paper.

2. Dual Training System in the Philippines

In the Philippines, TESDA was established in 1994 and mandated by law to formulate coordinated and fully-integrated technical education and skills development policies, plans, and programs.[1] TESDA administers competency assessments and certifications with the intent of professionalizing mid-skilled workers. It develops competency standards and qualifications, coupled with training standards and assessment instruments, which serve as a foundation for the registration, accreditation, and delivery of various programs. TESDA also provides equitable access and provision of programs to the growing number of TVET clients (Figure 1). It funds programs and projects for technical education and skills development and supports TVET institutions (TVIs) through trainer development programs, curriculum and materials development, career guidance and placement, and scholarship programs.

TESDA's vocational training programs are delivered in three modes of training, namely (a) institution-based (school-based and center-based), (b) enterprise-based, and (c) community-based. Among the three modes, the enterprise-based mode comprises the smallest share (Table 1). The composition of enrollment and graduation in 2016 demonstrates that institution-based training (delivered by

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[1] Republic Act No. 7796, also known as the TESDA Act of 1994.

schools and TVIs) accounted for 51 percent and 49 percent of the total enrollment and graduates, respectively. Enrollment figures from 2010 to 2016 indicate an uptick in enrollees and graduates of the institution-based mode, which may be attributed to a 57 percent increase in the number of TVIs (TVIs totaled 4,733 in 2013, and a majority were private). The enterprise-based mode broadly maintained a relatively low share of approximately three percent.

FIGURE 1. Trend of TVET enrollment, graduates, assessed, and certified (1995–2016)
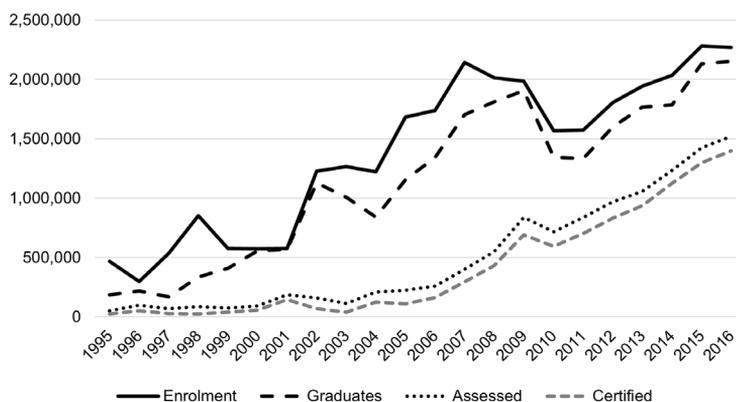
Source: Administrative data, many years, TESDA.

TABLE 1. TVET Enrollment and graduates by delivery mode (2010–2016)

Delivery Mode	2010		2013		2016	
	Number	Share	Number	Share	Number	Share
Enrollees	**1,568,617**	**100**	**1,572,131**	**100**	**2,269,665**	**100**
Institution-based	860,919	55	875,848	56	1,151,644	51
Enterprise-based	86,978	6	80,309	5	72,458	3
Community-based	620,720	40	615,974	39	1,045,563	46
Graduates	**1,344,371**	**100**	**1,332,751**	**100**	**2,151,236**	**100**
Institution-based	671,488	50	679,306	51	1,057,574	49
Enterprise-based	73,352	5	72,082	5	67,080	3
Community-based	599,531	45	581,363	44	1,026,582	48

Source: Administrative data, many years, TESDA.

There are three distinct program types within the enterprise-based mode: (a) apprenticeship, (b) learnership, and (c) the DTS. The DTS uniquely involves theoretical instruction and is jointly implemented by TVIs and companies, while apprenticeship and learnership programs predominantly provide skills training in TESDA-approved partner companies for a maximum of six or three months, respectively. In the DTS, schools and partner companies share the responsibility

of delivering well-coordinated learning experiences. Trainees spend about 40 percent of the total learning time in school and 60 percent in companies for hands-on training. The duration of the program varies depending on the complexity of the training content. On average, the DTS programs span a total of 1.5 to two years, consisting of about six months of in-school learning and ten months of in-company training. Trainees also receive an allowance of up to 75 percent of the minimum wage rate. Available statistics on the enterprise-based mode are limited, but the DTS accounts for about 40 percent of all enterprise-based programs regulated by TESDA, with apprenticeship and learnership programs accounting for 25 percent and 35 percent, respectively [Orbeta and Esguerra 2016].

The Philippine government offers tax incentives to encourage the participation of companies in the DTS. Per the Republic Act No. 7986,

> they shall be allowed to deduct from their taxable income the amount of fifty percent (50%) of the actual system expenses paid to the Accredited Dual Training System Educational Institution for the establishment's trainees, provided that such expenses shall not exceed five percent (5%) of their total direct labor expenses but in no case to exceed twenty-five million pesos (₱25 million) a year.

In 2015, 706 TESDA-accredited partner companies and 108 TVIs/schools were involved in delivering the DTS program [Mapa et al. 2016]. In addition to tax breaks, companies can reduce recruitment and training costs as well as maintenance costs. The rationale for the DTS is that skills gaps in training can be avoided as training investments respond directly to the needs of employers. Expected advantages for trainees include access to advanced technologies in industries as well as earnings during training.

Some TVIs assert that the DTS provides a smoother transition from training to employment. Absorption rates have ranged from 80 percent to 90 percent, with graduates often employed by the companies they received OJT.[2] This employment rate is exceedingly high compared to the overall employment of TVET graduates, which has remained around 65 percent with a trend of improvement in the last several years [Mapa et al. 2016].

3. Analytical approach

This study estimates and compares the labor market outcomes, such as wages and employment, of graduates from the DTS and other RPs. The analysis is based on a standard Mincerian model to estimate the labor market returns to the DTS as a function of salary and employment opportunities after graduation from these specific vocational training programs. Specifically, we analyze the

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[2] Based on communications with TVIs such as MERALCO Foundation Institution (MFI), Dualtech, Don Bosco Tech, and Jacobo Z. Gonzales Memorial School of Arts and Trades.

associations between outcome variables, such as the natural log of labor earnings or employment probabilities, and explanatory variables, such as different modes of vocational programs and individual characteristics of graduates (such as years of schooling, work experience, final high school grades, and maternal education) using Mincerian-type regressions.

The survey analyzed in this study was conducted in the Philippines prior to the recent expansion of basic education to Grade 12, so TVI trainees are high school (HS) graduates who completed Grade 10 (or four years of junior HS). The analysis is performed on graduates from vocational programs. The study does not analyze the characteristics of those who did not graduate given data limitations; however, the dropout rate from these programs has remained low.

Associations between the natural log of labor earnings and characteristics, such as different modes of vocational programs and individual characteristics of graduates (such as years of schooling, work experience, final HS grades, and maternal education) are analyzed using Mincerian-type regressions. To account for variations across different training programs offered through the DTS or RPs, variables for the enrollment year and TVIs are controlled in the equation.

These calculations are estimated using ordinary least squares for wages or probit regressions for discrete labor market outcomes, such as employment incidence. The employment incidence is analyzed at two stages: (a) immediately after graduation from a vocational training program; and (b) at the time of tracking survey completion, which occurred several years after graduation from vocational training programs.

The specific equation applied is as follows:

$$Y_i = \alpha + \beta_1 DTS_i + \beta_2 X_i + \varepsilon_i \qquad (1)$$

where Y_i is a labor market outcome (such as wage or employment), DTS_i is a controlled variable for enrolling in either the DTS (=1) or RPs (=0), and X_i is a set of other factors that may affect Y_i (for example, general average HS grade,[3] years of schooling, work experience, enrollment year, and a controlled variable for TVI).

In an alternative specification, the potential impact of general human capital on the DTS was also tested using a general average HS grade. The average HS grade is transformed into a standardized value[4] for analysis. This conditional hypothesis can be tested with an interaction term using the first equation and can be regarded as an adjustment to the slope coefficient on the HS grade for the DTS graduates.

$$Y_i = \alpha + \beta_1 DTS_i \times HSG_i + \beta_2 X_i + \varepsilon_i \qquad (2)$$

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[3] The average HS grade is a measure observable to all at the final stage of HS.

[4] The average HS grades (in raw score) take values of 0 to 100. By converting them into standardized z-scores, the observed values are expressed in terms of standard deviations from their means. They have a distribution with a mean of 0 and a standard deviation of 1. If the average HS scores are above the mean, the standardized value is positive. Scores below the mean result in negative standard scores.

Subsequently, the DTS graduate sample is analyzed in isolation to determine whether different aspects of the DTS program delivery are related to their labor market outcomes. The DTS programs are highly heterogeneous as a result of being offered in various industrial sectors to address occupation-specific skills. Since the TVIs partner with different companies, factors such as time allocation for in-school learning and in-company training (OJT), the intensity of OJT training, and the application of learning methods can vary.

A methodological challenge acknowledged by the study is the participants' selective enrollment in the DTS programs. Trainees who enter the DTS-specialized institutions are a select group that do not represent the population of vocational trainees in general. Only institutions that offer both the DTS and RPs are used in the survey sample so that comparison is feasible within an institution. Results should be taken with caution and interpreted as conditional associations rather than direct influences.

4. Data used for analysis and descriptive statistics

A tracking survey was conducted to collect information regarding the DTS and RP graduates and their labor market outcomes. The survey was conducted from January to March 2016 in Region III, Region IV-A, and the National Capital Region (NCR). Participants included 958 respondents who enrolled in the DTS or RPs in nine TVIs from the specified regions beginning from 2008. All participants subsequently completed the program.[5] Clustered random sampling was applied to randomly select former trainees from each of the chosen clusters or the TVIs.

The following four criteria are met by the selected TVIs: (a) both the DTS and RPs are in operation within the same institution, (b) trainees are assessed objectively when selected for the DTS, (c) records are maintained under good conditions for several years, and (d) they are located in Region III, Region IV-A, or the NCR.[6] The first condition is essential because the impact of the DTS relative to the RPs is estimated after controlling for institution-specific factors. Careful investigations identified nine TVIs that satisfy the four criteria (Table 2).[7]

Any trainees who did not graduate from their program were randomly replaced in the sample. The sampling randomly chose 20 trainees from the DTS and 20 trainees from the RPs within each TVI/enrollment cohort cell. Since the sample excluded those who did not complete their program for various reasons, the findings are conditional on having graduated from a program. As noted earlier, the

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[5] Those who did not complete the programs in which they initially enrolled were randomly replaced in the sample.

[6] Historically the DTS was first adopted in Regions III and IV-A, which accounts for a relatively high number of TVIs that implement the DTS in those regions.

[7] The survey included the National College of Science and Technology (NCST) in Cavite, but the analysis dropped observations from the NCST because it was later found that the institution only has the DTS. Non-DTS courses were part of their college program, which are not comparable to the DTS.

graduation rate for TVET remained around 90 percent, with a relatively low drop-out rate in recent years. The completion rate was slightly higher for enterprise-based training programs compared to other programs.

TABLE 2. Sample TVIs, type, and sample size

Region	Name of TVI	Type	Size of TVI	Sampled former trainees	
				Original	After trimming
III	Gonzalo Puyat School of Arts and Trade	Private	Small	29	28
III	Jocson College	Private	Small	49	43
III	Provincial Training Center - Orion	Public	Large	160	150
III	Provincial Training Center - Tarlac	Public	Large	112	106
III	Regional Training Center - Mariveles	Public	Large	194	140
IV-A	Jacobo Z. Gonzales Memorial School	Public	Large	150	134
IV-A	Provincial Training Center Rosario	Public	Medium	85	80
IV-A	Quenas National Agricultural School	Public	Medium	18	10
NCR	MFI	Private	Large	145	142
Total				942	833

Source: DTS Tracking Survey Data 2015, World Bank.

The survey tracked individuals who graduated from vocational training programs several years prior and were already in the labor market. As a result, tracking activities involved a substantial amount of effort in contacting, locating, and interviewing the trainees in the sample.[8] Simultaneously, an institution survey was conducted to collect information from the sample TVIs on enrollment records, programs, and institutional costs.

The sample was screened and filtered based on the consistency between actual and reported programs in which trainees enrolled. The number of trainees from the Provincial Training Center in Mariveles, Bataan was substantially reduced from 194 to 140 due to survey implementation challenges and poorly maintained institutional records. The resulting effective sample size was 833, with 362 trainees from the DTS and 471 trainees from the RPs. A look at yearly enrollment numbers highlights a relatively stable balance between the DTS and RPs across the survey period (Table 3).

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[8] The selected TVIs provided lists and contact information for the graduates who were randomly chosen for the survey sample.

TABLE 3. Sample former trainees by enrollment year

Program type	Enrollment year									
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**Total**
RP	1	12	28	30	50	113	131	97	9	471
DTS	2	18	30	37	53	79	93	47	3	362
Total	3	30	58	67	103	192	224	144	12	833

Source: DTS Tracking Survey Data 2015, World Bank.

The survey asked sampled graduates of both the DTS and RPs for their impression of various benefits related to the training they received from TESDA (Figure 2). Graduates of the DTS reported higher levels of employment opportunities and earnings on average compared to graduates of the RPs. The average scores of self-evaluation among DTS graduates on their acquired skills, confidence levels, attitudes relevant to work, and earned trust from their employers and colleagues were also consistently higher than those among RP graduates.

FIGURE 2. Self-evaluation about the impacts of training received from TESDA
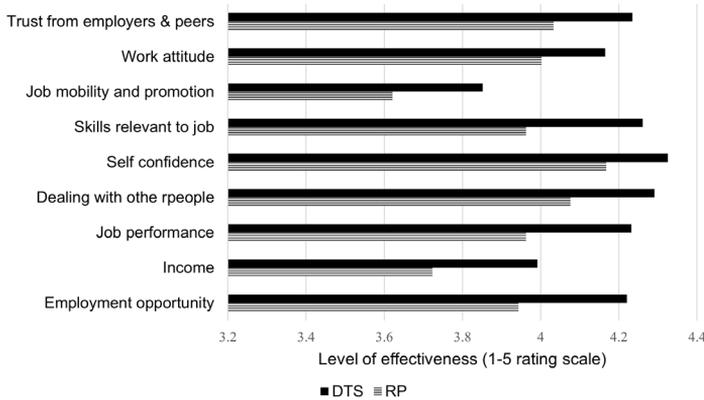
Source: DTS Tracking Survey Data 2015, World Bank; World Bank calculations.
Note: These self-evaluated impacts were reported in a five scale of effectiveness and these differences between DTS and RP graduates are all statistically significant at five percent.

Table 4 provides summary statistics of the labor market outcomes among the survey sample. While both current salary and employment status figures appear higher for the DTS graduates, the differences are not statistically significant between the two groups. However, there are greater employment opportunities after training completion among the DTS graduates compared to the RPs graduates. The employment rate of the DTS graduates in the survey is high, which corresponds with the employment rate officially reported by TESDA.

TABLE 4. Comparing wages and employment incidence of former trainees by the DTS and RPs

Variables	All		RP		DTS		Difference (a) − (b)
	N	Mean	N	Mean (a)	N	Mean (b)	
Latest monthly salary	456	11,408	212	11,044	195	12,199	−1,155
Currently employed	833	68%	471	68%	362	69%	−0.8%
Currently employed as wage earner	833	59%	471	57%	362	62%	−5%
Employed right after TESDA training	833	74%	471	70%	362	82%	−11.8%***

Source: DTS Tracking Survey Data 2015, World Bank.
Note: *** Statistically significant at one percent level.

Table 5 provides summary statistics of the basic characteristics of the DTS and RP graduates in order to assess the potential impact of alternative factors (Table 5). The data demonstrate a higher average age and a greater number of males among the RPs graduates compared to the DTS graduates. Years of schooling (the total number of years spent in formal elementary and high schools), post-secondary vocational training, and tertiary education are nearly the same between graduates of both programs.

TABLE 5. Comparing basic characteristics of the DTS and RP graduates

Variables	All		RP		DTS		Difference (a) − (b)
	N	Mean	N	Mean (a)	N	Mean (b)	
Age	833	26.6	471	28.6	362	23.9	4.7***
Gender (% female)	833	34%	471	22%	362	50%	−28%***
Formal education (no. of years)	833	12.1	471	12.0	362	12.3	−0.2*
General average grade at HS graduation	833	82.6	471	82.1	362	83.3	−1.2***
TVET (no. of years)	833	0.7	471	0.3	362	1.4	−1.1***
College enrollment - before TVET (%)	833	17%	471	25%	362	8%	17%***
College completion - before TVET (%)	833	24%	471	35%	362	11%	24%***
College enrollment - after TVET (%)	833	9%	471	12%	362	5%	8%***
College completion - after TVET (%)	833	1%	471	1%	362	1%	0%
Work experience (no. of years)	833	9.4	471	11.6	362	6.6	5.0***
Years since graduating TVET	833	3.3	471	3.5	362	2.9	0.6***

Source: DTS Tracking Survey Data 2015, World Bank.
Note: *** Statistically significant at one percent level.

The general average grade at HS graduation (Grade 10) is also nearly the same between the DTS and RPs graduates. The distribution of the raw general average HS grades of the survey sample is comparable among the two groups (Figure 3). The general average grade, reported from 1 to 100-point scores, is computed by simply dividing the sum of all final grades by the number of learning areas. Students with final grades of at least 75 in all learning areas can earn high school certificates and be promoted to the next level. For example, a general average HS grade of close to the full point (100 points) is necessary to enter the most prestigious universities in the country.

FIGURE 3. Distribution of the RP and DTS trainees by general average HS grade
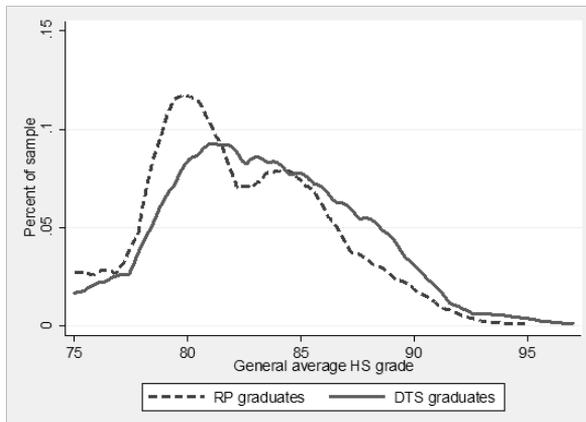
Source: DTS Tracking Survey Data 2015, World Bank; World Bank calculations.
Note: These self-evaluated impacts were reported in a five scale of effectiveness and these differences between DTS and RP graduates are all statistically significant at five percent.

Academic qualification prior to completing vocational training is generally higher among the RP trainees compared to the DTS trainees, and this difference is statistically significant. Among former trainees in the RPs, one out of four has enrolled in college but stopped, and one out of three graduated from college before starting their vocational training.

Finally, the manner in which the DTS programs are implemented in schools and companies was presented (Table 6). The data demonstrate that the total duration to complete TVI-based learning and in-company training is about 1.4 years, which is substantially longer than the average duration of the RPs training. About 70 percent of the DTS trainees were supervised during their in-company training and benefitted from support in mastering work processes, while a smaller proportion learned independently or from peer trainees. At graduation, about 70 percent of trainees had obtained the National Certificate (NC)[9] level 2 or above, while six percent earned the NC Level 1 or Certificate of Competency (COC)[10] distinction.

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[9] The NC is issued when a candidate has demonstrated competence in all units of competency that comprise a qualification (TESDA).

[10] The COC is issued to individuals who have satisfactorily demonstrated competence on a single or cluster of units of competency (TESDA).

The higher-level NCs generally have certificate credentials in the labor market, while the other certificates have limited values by themselves. About one-third did not earn any certificate.

TABLE 6. Delivery aspect of the DTS programs

Implementation aspects	Description	Average among DTS trainees
DTS implementation scheme (%)	Block release (scheme=1)	91.0
	Day release (scheme=2)	9.0
How work processes were learned during OJT (%)	Adequate guidance from supervisors	23.0
	Learned from peers	5.0
	Learned by doing it yourself	6.0
	All above	48.0
Certification upon graduation (%)	Higher level (NC2–NC5)	71.0
	Lower level (NC1 or COC)	6.0
	No certificate	27.0
Actual length for in-TVI training and in-plant training	Total number of weeks spent in school/TVIs	26.7
	Total number of weeks spent in company/plant	40.7
	Weekly total number of hours spent for OJT	45.2

Source: DTS Tracking Survey Data 2015, World Bank.
Notes:
a. Block release refers to a schedule where students/trainees complete 40 percent of their training full-time in a TVI, then complete the remaining 60 percent of their training full-time in a plant. (TESDA Circular No. 31 s.2012)
b. Day release refers to a schedule where trainees spend two days per week in a school and the remaining work days in a plant. (TESDA Circular No. 31 s.2012)

5. Estimation results on labor market outcomes of DTS

Labor market outcomes of the DTS compared to the RPs were estimated using the survey data. Tables 7-11 present estimated coefficients in the labor wage or employment equations with selected independent variables of interest (see the previous section for the detailed analytical approach).

A simple linear regression model was adopted by changing key control variables such as enrollment year, the TVIs, or both, and supposing substantial effects on the outcomes. This reflects the programs' possible heterogeneity. The same regression was estimated by including the interaction term to assess the relationship between the standardized general average HS scores in the DTS versus other RPs. Additional characteristics such as gender, work experience, and years of schooling are also included in the specification.

TABLE 7. Wage premium (%) for the DTS, general average HS grade - OLS estimate on latest salary

Variables	(1)	(2)	(3)	(4)	(5)
	RP and DTS	RP and DTS	RP and DTS	RP and DTS	RP and DTS
DTS dummy (=1, RP=0)		0.118** (1.996)	0.081 (1.260)	0.047 (0.715)	0.039 (0.711)
Standardized HS grade	0.032 (1.081)	0.027 (0.856)	0.027 (0.846)	−0.029 (-0.923)	0.011 (0.249)
DTS* std. HS grade					-0.082*** (-3.698)
Years of schooling	0.072*** (3.708)	0.082*** (3.813)	0.072*** (3.175)	0.051** (2.178)	0.047* (2.046)
Work experience	0.008 (0.827)	0.011 (1.047)	0.009 (0.842)	0.017 (1.613)	0.016 (1.155)
Work experience (squared)	−0.000 (−1.227)	−0.000 (−1.482)	−0.000 (−1.239)	−0.000** (−2.118)	-0.000 (-1.500)
Female	0.011 (0.206)	0.019 (0.320)	0.044 (0.737)	0.032 (0.504)	0.036 (0.661)
Mother's education level	0.001 (1.104)	0.001 (1.357)	0.001 (1.369)	0.001a (1.752)	0.001* (2.005)
Constant	8.215*** (31.719)	8.024*** (27.156)	8.120*** (24.868)	8.689*** (19.895)	8.669*** (24.815)
Observations	399	356	354	356	354
R-squared	0.051	0.068	0.087	0.145	0.157
Enrollment year controlled	NO	NO	YES	NO	YES
TVI controlled	NO	NO	NO	YES	YES

Source: DTS Tracking Survey 2015, World Bank. World Bank calculations.
Note: Robust *t*-statistics in parentheses. *$p<0.1$; **$p<0.05$; ***$p<0.01$

The heterogeneity of TVIs and programs affects the estimation results of returns to the DTS. Estimates on labor earnings were assessed by calculating the log of graduates' latest monthly salary (Table 7). The results highlight that the coefficient on the DTS programs is positive and significant in the simplest specification, in which neither the controlled TVI variable nor enrollment year is included (see Column 2). The result becomes insignificant when the controlled TVI variable and enrollment year are included in the specification, taking different school-specific characteristics into account (see Columns 3 and 4). Different schools work with different employers, resulting in distinctly different OJT programs across the years, and this variation seems to have an impact on the estimation results.

The findings suggest that the DTS programs have a stronger positive relationship to labor earning among trainees with lower general average HS grades as compared to trainees with higher grades. The coefficient of the interaction

term between the average general HS grade and the DTS shows significant and negative effects, while neither of the parameters of the DTS and average HS grade is statistically significant (see Column 5). A standardized HS grade score of −1 will yield an interaction term coefficient of 0.082, which means an 8.2 percent increase in salaries (relative to the RPs) can be expected if trainees were among the lower academic end of basic education and could graduate from the DTS programs. For comparison, the average rate of returns to an additional year of schooling is five percent per year.

Therefore, practical skills training through OJT appears effective in developing human capital, particularly among those who did not perform well academically during basic education. Holding other variables constant, this translates to a difference in labor earnings of at least ₱955 per month, or approximately US$240 per year, between the DTS trainees in the bottom or top 16 percent of post-secondary trainees overall. By the same standards, if lower HS academic achievers choose the DTS instead of the RPs, they can gain an additional ₱497 per month or an equivalent of US$120 per year. Such increases are not insignificant in the context of today's labor market conditions in the Philippines.

TABLE 8. Employment probability for the DTS, general average HS grade - probit estimate on current employment (marginal effects reported)

Variables	(1)	(2)	(3)	(4)	(5)
	Total	Total	Total	Total	Total
DTS dummy (=1, RP=0)		0.082** (2.053)	0.062 (1.539)	0.042 (1.014)	0.039 (0.934)
Standardized HS grade	0.039** (2.165)	0.038** (2.043)	0.042** (2.225)	0.035* (1.792)	0.121 (1.255)
DTS* std. HS grade					−0.047 (−1.183)
Years of schooling	0.003 (0.255)	0.002 (0.203)	0.002 (0.205)	−0.003 (−0.236)	0.002 (0.137)
Work experience	0.000 (0.071)	0.002 (0.503)	0.001 (0.291)	0.005 (1.191)	0.006 (1.240)
Work experience (squared)	−0.000 (−0.183)	−0.000 (−0.500)	−0.000 (−0.343)	−0.000 (−1.231)	−0.000 (−1.231)
Female	−0.118*** (−3.381)	−0.140*** (−3.599)	−0.124*** (−3.163)	−0.106** (−2.465)	−0.105** (−2.437)
Mother's education level	−0.002 (−1.530)	−0.002* (−1.836)	−0.002** (−2.195)	−0.002** (−1.994)	−0.003** (−2.409)
Observations	840	745	742	745	742
Enrollment year dummy	NO	NO	YES	NO	YES
TVI dummy	NO	NO	NO	YES	YES

Source: DTS Tracking Survey 2015, World Bank. World Bank calculations.
Note: z-statistics in parentheses. *$p<0.1$; **$p<0.05$; *** $p<0.01$

The relationship between the DTS and graduates' employment opportunities was also compared with that of RPs and their graduates (Tables 8 and 9). The DTS graduates were more likely to be employed, especially right after completing the program, compared to graduates of the RPs (Table 9). The employment incidence immediately after completing training was consistently seven percentage points higher among the DTS trainees. This positive impact on employment probability diminishes over time. When accounting for variations across the TVIs and enrollment years, the employment probability among DTS graduates does not significantly differ from vocational programs several years after graduation.

The general average HS grade is also strongly associated with employment. However, the coefficient of the interaction term between the DTS and general average HS grade is not statistically significant for employment probability.

Returns to training or employment probabilities are surely different across heterogeneous program characteristics in DTS implementation. As previously noted, the DTS programs are broadly defined by TESDA, and each program design differs depending on the participating TVIs and companies. Therefore, the sample of DTS graduates was analyzed in order to estimate returns to different aspects of the program.

TABLE 9. Employment probability for the DTS, general average HS grade - probit estimate on employment right after TVET (marginal effects reported)

Variables	(1)	(2)	(3)	(4)	(5)
	Total	Total	Total	Total	Total
DTS dummy (=1, RP=0)		0.073**	0.062*	0.078**	0.058
		(2.079)	(1.845)	(2.086)	(1.597)
Standardized HS grade	0.008	0.008	0.010	0.007	0.119
	(0.481)	(0.485)	(0.641)	(0.386)	(1.402)
DTS * std. HS grade					−0.030
					(−0.864)
Years of schooling	−0.005	−0.004	−0.021**	−0.007	−0.014
	(−0.521)	(−0.404)	(−2.251)	(−0.628)	(−1.340)
Work experience	−0.016***	−0.015***	−0.014***	−0.014***	−0.016***
	(−4.908)	(−4.269)	(−4.168)	(−3.785)	(−4.156)
Work experience (squared)	0.000***	0.000***	0.000***	0.000***	0.000***
	(3.069)	(2.840)	(2.758)	(2.598)	(2.655)
Female	−0.010	−0.047	−0.050	−0.059	−0.042
	(−0.308)	(−1.344)	(−1.558)	(−1.541)	(−1.131)
Mother's education level	−0.001	−0.001	−0.001	−0.001	−0.001
	(−1.257)	(−1.301)	(−1.407)	(−1.391)	(−1.233)
Observations	840	745	830	745	742
Enrollment year dummy	NO	NO	YES	NO	YES
TVI dummy	NO	NO	NO	YES	YES

Source: DTS Tracking Survey 2015, World Bank. World Bank calculations.
Note: z-statistics in parentheses. *$p<0.1$; **$p<0.05$; *** $p<0.01$

The analysis suggests higher intensity in-school training during the DTS is positively related to earnings (Table 10) by an additional three-four percentage points per additional week. In-company training intensity is not related to additional wages, but it is positively related to employment incidence (Table 11). While an increase in the overall duration of in-company training projects are negligible monetary benefits, an additional hour of in-company training per week can increase the employment rate by two-three percentage points. Monitoring visits by instructional trainers from TVIs were also found to potentially increase employment probability. Other aspects of program design and delivery did not show significant association with earning and employment outcomes.

TABLE 10. Wage premium (%) for the DTS, general average HS grade - OLS estimate on latest salary

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	DTS	DTS	DTS	DTS	DTS	DTS
Years of schooling	0.062**	0.045	0.052	0.057	0.049	0.049
	(2.331)	(0.799)	(1.164)	(1.173)	(0.872)	(1.106)
Standardized HS grade	0.029	0.027	−0.013	0.027	0.029	−0.006
	(0.667)	(0.542)	(−0.291)	(0.663)	(0.616)	(−0.120)
Work experience	0.007	0.008	0.018	0.011	0.012	0.022**
	(0.604)	(0.702)	(1.679)	(1.064)	(1.199)	(2.699)
Work experience (squared)	−0.000	−0.000	−0.000*	−0.000	−0.000	−0.000**
	(−0.960)	(−0.782)	(−1.933)	(−1.235)	(−1.288)	(−3.254)
Female	0.022	−0.113	0.008	−0.114	−0.124	−0.022
	(0.223)	(−1.281)	(0.076)	(−1.281)	(−1.817)	(−0.223)
Mother's educational level	0.001	0.001	0.001	0.001	0.001	0.001
	(1.030)	(1.547)	(1.268)	(1.849)	(1.532)	(1.257)
DTS implementation scheme dummy (1=Block release)		0.104				0.060
		(1.734)				(1.566)
Given training plan from TVI (1=yes)		0.019				0.049
		(0.257)				(0.803)
Weeks spent for in-school learning			0.003**			0.004**
			(3.391)			(3.119)
Weeks spent for in-company training			−0.002			−0.002
			(−1.235)			(−1.440)
Number of hours per week for in-company training			−0.011			−0.005
			(−0.447)			(−0.232)
Number of hours per week for in-company training (squared)			0.000			0.000
			(0.234)			(0.021)
How to learn work process - from supervisors				0.127		0.092
				(1.168)		(0.900)
How to learn work process - from peers				−0.013		−0.078
				(−0.128)		(−0.853)
How to learn work process - by yourself				−0.200		−0.193
				(−1.833)		(−1.728)

**TABLE 10. Wage premium (%) for the DTS, general average HS grade -
OLS estimate on latest salary (continued)**

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	DTS	DTS	DTS	DTS	DTS	DTS
How to learn work process - from all				0.042 (0.462)		0.001 (0.014)
Reported to TVI during in-company training (1=yes)					0.009 (0.181)	−0.035 (−0.846)
Times visited TVI teacher during in-company training (1=yes)					−0.004 (−1.463)	−0.003 (−1.655)
Constant	8.226*** (23.766)	8.612*** (12.073)	8.899*** (18.858)	8.277*** (13.949)	8.634*** (13.266)	8.696*** (15.532)
Observations	397	192	192	206	189	189
R-squared	0.070	0.096	0.171	0.113	0.100	0.198
Enrollment year dummy	YES	YES	YES	YES	YES	YES
School dummy	YES	YES	YES	YES	YES	YES

Source: DTS Tracking Survey 2015, World Bank. World Bank calculations.
Note: Robust t-statistics in parentheses. *$p<0.1$; **$p<0.05$; *** $p<0.01$

**TABLE 11. Employment probability for the DTS, general average HS grade -
probit estimate on current employment status (marginal effects reported)**

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	DTS	DTS	DTS	DTS	DTS	DTS
Years of schooling	0.001 (0.019)	−0.028 (0.018)	−0.037** (0.018)	−0.022 (0.016)	−0.025 (0.016)	−0.046*** (0.015)
Standardized HS grade	0.040*** (0.014)	0.024 (0.032)	0.017 (0.036)	0.028 (0.029)	0.017 (0.035)	0.017 (0.035)
Work experience	−0.000 (0.003)	−0.004 (0.006)	−0.005 (0.007)	−0.003 (0.003)	−0.005 (0.004)	−0.005 (0.007)
Work experience (squared)	−0.000 (0.001)	0.000** (0.001)	0.000* (0.001)	0.000*** (0.001)	0.000*** (0.001)	0.000* (0.001)
Female	−0.114*** (0.023)	−0.154*** (0.029)	−0.142** (0.059)	−0.156*** (0.041)	−0.148*** (0.038)	−0.113 (0.074)
Mother's educational level	−0.002* (0.001)	−0.002** (0.001)	−0.002** (0.001)	−0.001* (0.001)	−0.003** (0.001)	−0.003*** (0.001)
DTS implementation scheme dummy (1=Block release)		0.071 (0.138)				0.055 (0.150)
Given training plan from TVI (1=yes)		−0.034 (0.067)				−0.019 (0.060)
Weeks spent for in-school learning			0.001 (0.003)			0.001 (0.002)
Weeks spent for in-company training			0.003*** (0.001)			0.002*** (0.001)
Number of hours per week for in-company training			0.032*** (0.011)			0.029*** (0.011)

TABLE 11. Employment probability for the DTS, general average HS grade -
probit estimate on current employment status (continued)

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	DTS	DTS	DTS	DTS	DTS	DTS
Number of hours per week for in-company training (squared)			−0.000*** (0.000)			−0.000*** (0.000)
How to learn work process - from supervisors				0.086 (0.093)		−0.040 (0.112)
How to learn work process - from peers				−0.137 (0.125)		−0.204 (0.144)
How to learn work process - by yourself				0.009 (0.158)		−0.010 (0.118)
How to learn work process - from all				0.073 (0.088)		−0.018 (0.077)
Reported to TVI during in-company training (1=yes)					0.021 (0.039)	0.022 (0.039)
Times visited TVI teacher during in-company training (1=yes)					0.006** (0.003)	0.002 (0.002)
Observations	837	374	374	407	365	418

Source: DTS Tracking Survey 2015, World Bank. World Bank calculations.
Note: Standard errors in parentheses. *p<0.1; **p<0.05; *** p<0.01

6. Conclusion

This paper focused on the DTS experience in the Philippines as one of the various vocational training programs which offer plenty of opportunities for on-the-job training and work experience. The paper finds that DTS has favorable labor market returns compared to other types of training modalities and greater impacts in terms of the labor market and skills enhancement compared to other school-based vocational training programs.

Although the overall impact of completing training in the DTS was not confirmed after controlling for heterogeneity across TVIs or programs, the results show that high monetary rewards are strongly associated with the DTS trainees who had weaker academic performance in basic education. Those students without a strong academic performance in high school can still expect better earnings prospects by pursuing a path to build practical skills through vocational training programs such as the DTS. This relationship was not confirmed among the sampled graduates of the RPs, who consistently showed a positive link between grade and labor market returns after vocational training. While graduates with weaker academic performance fare better compared to others in DTS, it is important to acknowledge that the effect is minimal, and the results are conditional on graduation.

The intensity of in-company training, as opposed to the length of in-company training, was another critical factor that supported higher returns to the DTS graduates. Monitoring visits by TVI instructors during in-company training also suggest important outcomes in the labor market, even when controlling for different TVIs and programs. These results suggest that in order to promote program quality, increasing the intensity of in-company training experiences and implementing frequent supervision could be effective strategies for companies participating in the DTS and TVIs.

While the conclusions of the study are drawn through reasonable data analysis, due to methodological limitations, the results are conditional on graduation from vocational programs. The rate of return for the program can also vary over the working lifecycle or by cohort, something that cannot be looked at with the available data. The study also did not analyze the characteristics of those who drop out of vocational programs. Further investigation may be necessary in order to confirm the efficiency of practical training opportunities.

Further research would also involve estimating the full cost-benefit estimates of the program. This is particularly important for policymakers who must decide on vocational training spending and prioritization of vocational training programs. Decisions on vocational training spending and prioritization of vocational training programs should rely on social rates of return beyond the private returns estimated in this report (e.g., higher salaries for DTS graduates in relation with RPs) and be dependent on fully accounting for the differential costs of programs.

Finally, an analysis with more recent data may be warranted. The advance of technological developments, along with the economic cycle (including deep recessions as the one faced by the country in 2020-2021 due to the COVID-19 pandemic), can raise different conclusions that may affect current training investment decisions.

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