Feature Article

IMPACT OF ACADEMIC CONTINUING EDUCATION AND TRAINING POST-DIPLOMA PROGRAMME ON EMPLOYMENT AND WAGE OUTCOMES

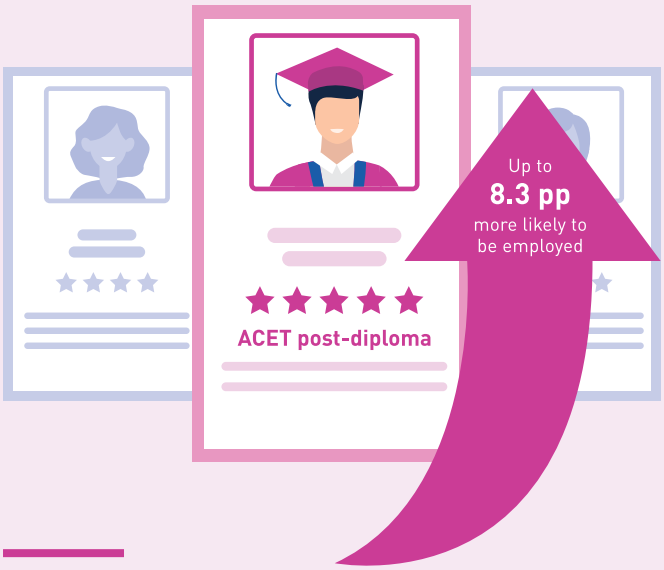
OVERVIEW

MOE introduced the Academic Continuing Education and Training (ACET) Post-Diploma programme in 2011 to support mid-career Singaporeans who wish to upskill and reskill.

FINDINGS

Finding 1:

Compared to their respective control groups of individuals with similar profiles, individuals who completed an ACET post-diploma were 3.0 percentage-points (pp) to 8.3pp more likely to be employed after graduation.

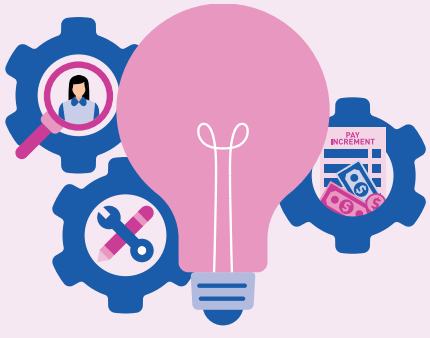


Finding 2:

Based on a comparison between ACET post-diploma participants and their respective control groups, completing an ACET post-diploma increased real monthly wages by 4.6 per cent to 10.8 per cent after graduation. In dollar terms, this translates to an increase of approximately $300 to $540.

POLICY TAKEAWAY

The ACET post-diploma programme was effective in improving the employment and wage outcomes of course participants. Going forward, the Singapore Government will continue to invest in upskilling and reskilling Singaporeans so that they can stay economically competitive and employable throughout their working lives.



EXECUTIVE SUMMARY

- The Ministry of Education (MOE) provides subsidies for the Academic Continuing Education and Training (ACET) Post-Diploma courses in order to support Singaporeans who wish to upskill or reskill through such courses. This study evaluates the impact of obtaining an ACET post-diploma Full Qualification (FQ) on the employment and wage outcomes of participants.

- We find that completing an ACET post-diploma FQ improved the employment outcomes of post-diploma FQ participants. Compared to their respective control groups of individuals with similar profiles, the likelihood of employment for ACET post-diploma FQ graduates was up to 8 percentage-points higher after completing the course.

- We also find positive wage returns to attaining an ACET post-diploma FQ. Specifically, we find that post-diploma FQ graduates enjoyed real monthly wages that were up to 11 per cent higher on average compared to their respective control groups after completing the course.

The views expressed in this paper are solely those of the authors and do not necessarily reflect those of the Ministry of Trade and Industry or the Government of Singapore.[1]

INTRODUCTION

In recent years, the Singapore Government has been placing more emphasis on developing the Continuing Education and Training (CET) ecosystem in order to provide Singaporeans with access to upskilling and reskilling opportunities to prepare them for the evolving needs of our economy, as well as ensure that they can pursue their career aspirations through a wider range of pathways. Against this backdrop, numerous CET pathways have been introduced by the Government, with one such pathway being the Academic Continuing Education and Training (ACET) Post-Diploma programme.

Specifically, the ACET Post-Diploma programme, which was introduced in 2011, offers courses under two broad qualification frameworks, namely (i) Advanced Diploma (AD) and Specialist Diploma (SD)[2], and (ii) Diploma (Conversion). The AD and SD focus on upskilling and are designed to provide diploma or degree holders with an opportunity to update and deepen their skills in their trained or practicing disciplines. On the other hand, the Diploma (Conversion) focuses on reskilling to support mid-career individuals in acquiring the skills that will enable them to take on a job in a different discipline.

Given the potential of the ACET Post-Diploma programme as a pathway for mid-career Singaporeans to acquire new skills and improve their labour market outcomes, this study examines the impact of the programme on the employability and wages of individuals who obtained a Full Qualification (FQ) under the programme.[3]

The rest of the article is organised as follows. We first provide a brief review of the literature related to the impact of training on individuals' labour market outcomes. We then describe the data and methodology employed for our study, before reporting our findings. The final section concludes.

LITERATURE REVIEW

In theory, training can affect the labour market outcomes of workers through two main channels. First, training increases labour productivity because workers learn and acquire new skills. In turn, their wages increase as firms value employees who have a higher level of human capital and are more productive. Second, training has signalling effects, which may contribute in part to the wage returns to workers. In particular, as employers could use the qualifications obtained as a signal of underlying ability, more educated workers may enjoy higher wages.

1 *We would like to thank Ms Yong Yik Wei, Dr Andy Feng, Mr Lee Zen Wea and Dr Tan Yi Jin for their useful suggestions and comments. We are also grateful to MOE (Higher Education Group) for their inputs to this study. All remaining errors belong to the authors.*

2 *The content of an AD course is generally more extensive than that for a SD course and as such, participants generally require more time to complete an AD course. Specifically, AD participants are generally required to complete three or more Post-Diploma Certificates (PDCs) in 1.5 to two years to obtain a FQ, whereas SD participants are generally required to complete two PDCs in a year to obtain a FQ.*

3 *While participants could complete part of the ACET post-diploma course to obtain one or more PDCs without the FQ, this study focuses only on the individuals who obtained the FQ by completing the full course.*

Empirically, the literature provides evidence that training is associated with positive wage returns. For instance, Konings and Vanormelingen (2015) found that in Belgium, a 10 percentage-point (pp) increase in the share of trained workers in a firm was associated with a 1.0 per cent to 1.7 per cent increase in the average wage per worker. Similarly, Kambourov et al. (2020) found that the wage returns to individuals who participated in government-sponsored training in the United States ranged from 7.7 per cent to 8.4 per cent, after controlling for broad occupational categories and occupational transitions.

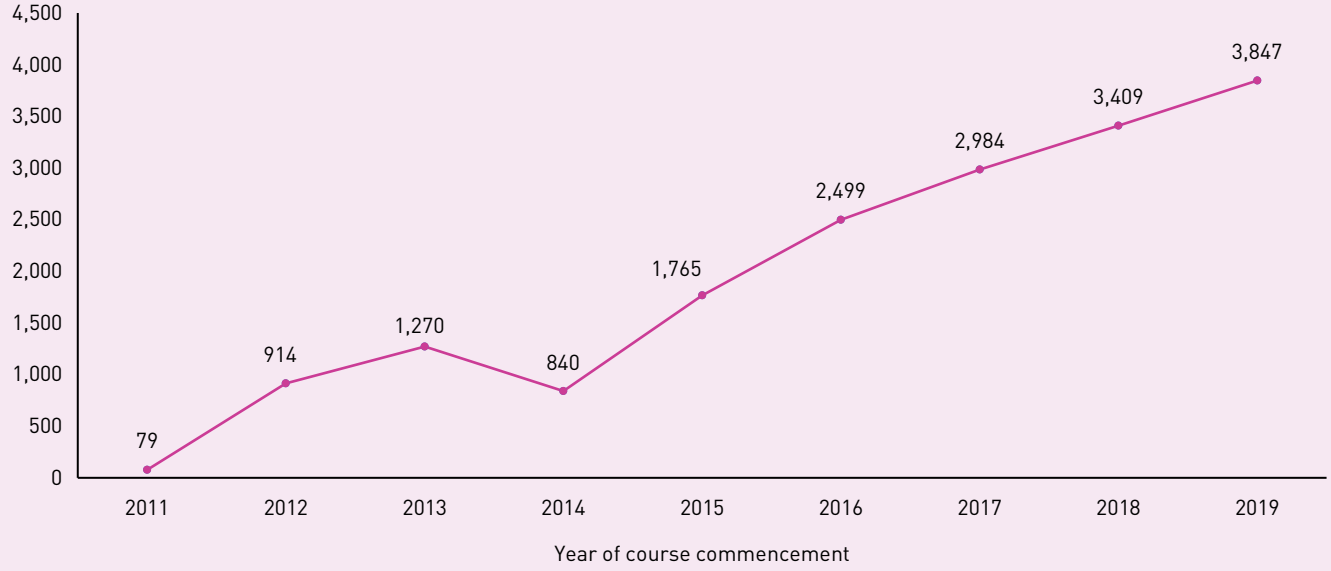
In Singapore's context, past studies have found that training undertaken by mid-career Singaporeans generally improved their labour market outcomes. For example, Wen and Teo (2018) found that trainees who achieved a Workforce Skills Qualifications (WSQ) FQ enjoyed a real wage premium of 5.8 per cent on average in the year after training compared to their control group. Additionally, WSQ FQ trainees who were not employed in the year of training were more likely to be employed in the following year.

DATA AND SUMMARY STATISTICS

This study uses course-level data on all locals (i.e., Singaporeans and Permanent Residents) who had enrolled in ACET post-diploma courses offered by the local polytechnics from 2011 to 2019 and obtained a FQ. This dataset includes information on relevant course characteristics (e.g., course commencement and graduation dates). The course-level dataset was merged with an individual-level longitudinal administrative dataset containing information on the employment history and wages of all local employees in Singapore between 2010 and 2020.

Based on the dataset assembled, there was a general uptrend in the number of individuals who enrolled in an ACET post-diploma course and eventually obtained a FQ (henceforth known as ACET post-diploma FQ participants) between 2011 and 2019 (Exhibit 1). Given the small number of individuals who commenced their post-diploma course in 2011 (i.e., 2011 cohort), the rest of the study focuses on the 2012 to 2019 cohorts.

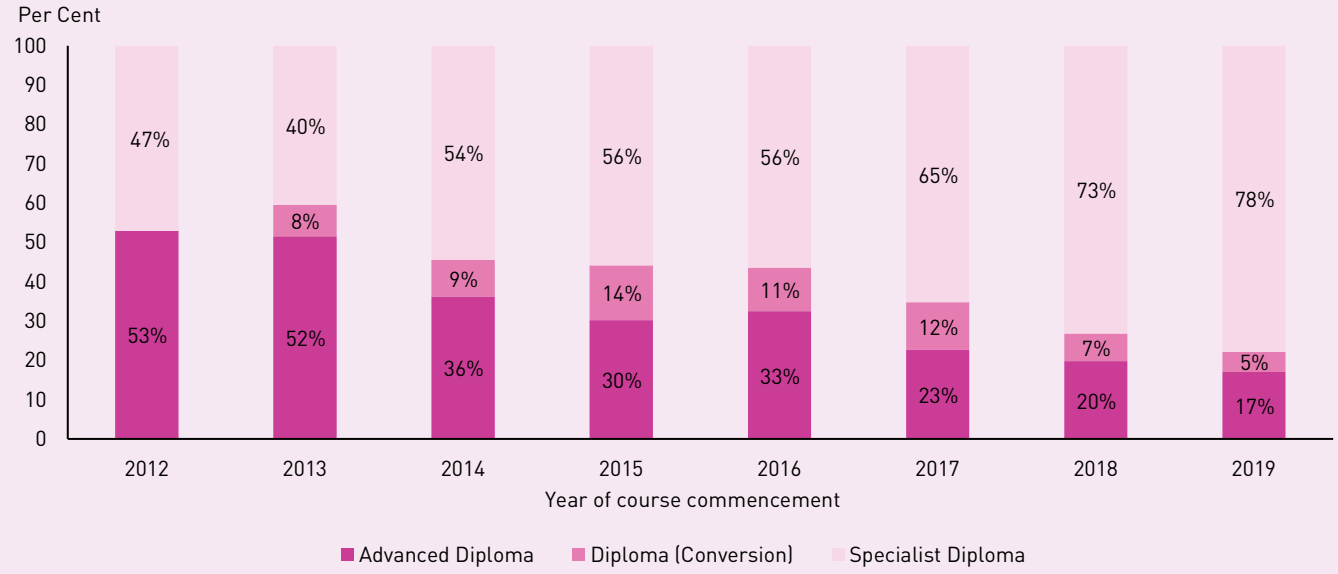
Exhibit 1: Number of Participants Enrolled in an ACET Post-Diploma Course and Obtained a FQ, 2011 to 2019 cohorts



Source: Ministry of Education (MOE)

We observe that among those who eventually completed a post-diploma FQ, a large proportion of them were enrolled in a SD course, with this proportion seeing an increase between 2012 and 2019 (Exhibit 2). By contrast, the proportion of post-diploma FQ participants who enrolled in an AD course generally declined over the same period, while the proportion who enrolled in a Diploma (Conversion) course remained relatively small.[4]

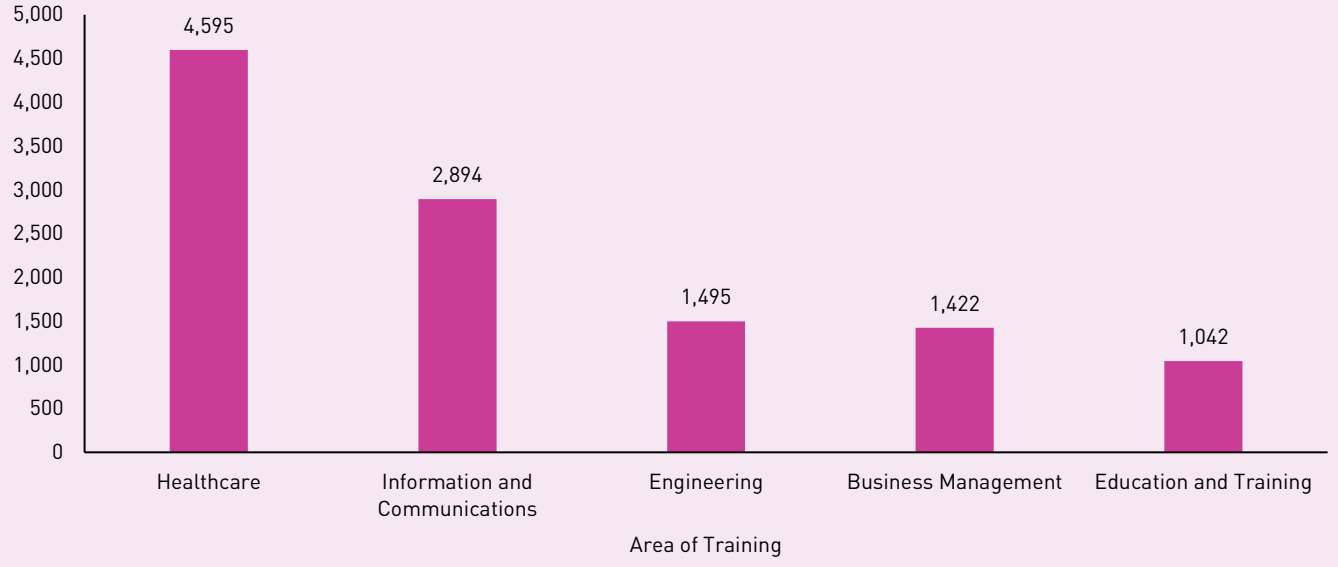
Exhibit 2: Distribution of Participants in the ACET Post-Diploma Programme who Obtained a FQ by Course Type, 2012 to 2019 cohorts



Source: MOE

We also observe that among the ACET post-diploma FQ participants in the 2012 to 2019 cohorts, close to 70 per cent of them were enrolled in the following Areas of Training (AOTs): Healthcare (27 per cent of participants), Information and Communications (17 per cent), Engineering (9 per cent), Business Management (8 per cent) and Education and Training (6 per cent) (Exhibit 3).

Exhibit 3: Top 5 AOTs among ACET Post-Diploma Participants who Obtained a FQ, 2012 to 2019 cohorts



Source: MOE

4 *As the Diploma (Conversion) programme was launched in 2013, there were no individuals in the programme among the 2012 cohort.*

EMPIRICAL METHODOLOGY

To estimate the causal impact of completing an ACET post-diploma FQ on the employment and wage outcomes of local employees, we combine matching methods with a difference-in-differences regression analysis. This two-step approach allows us to compare the employment and wage outcomes of two groups of individuals: a "treated" group that completed an ACET post-diploma FQ and an observably-similar "control" group that did not enrol in any ACET post-diploma courses. We conduct the analysis for each cohort of ACET post-diploma FQ participants separately.

First, we use Propensity Score Matching (PSM) to construct a matched control group for each cohort of ACET post-diploma FQ participants. The matched control group would be comparable to the treated individuals in terms of their observable characteristics and employment/wage outcomes prior to the commencement of the ACET course.[5] This step is necessary because the ACET post-diploma FQ participants were observably different from non-participants in the population. For instance, for the 2019 cohort, ACET post-diploma FQ participants were more likely to be: (i) younger, (ii) female, (iii) more educated, (iv) employed, and (v) higher earning conditional on employment (Exhibit 4) as compared to the non-participants. These differences, if not accounted for through matching methods, could lead to differences in the two groups' employment/wage outcomes being wrongly attributed to the impact of the ACET post-diploma FQ.

Exhibit 4: Summary Statistics on Characteristics of Individuals Before and After Matching, 2019 Cohort

	Before matching		After matching	
	Treated	Control	Treated	Control
Average age	32	44	32	32
Share of males	43%	51%	42%	43%
Educational attainment				
Share of bachelor's and post-graduate degree holders	47%	32%	45%	46%
Share of diploma holders	22%	16%	22%	21%
Employment status				
Share of employed individuals	89%	81%	89%	89%
Median monthly wages (conditional on employment)	$4,500	$3,500	$4,400	$4,100

Source: Authors' estimates

Second, we quantify the impact of the ACET post-diploma FQ on participants' employment and wage outcomes during the course, as well as after graduation, by comparing the trends in their outcomes against that of their matched control groups using a difference-in-differences regression model.[6] The regression model allows us to control for time-invariant unobservable characteristics specific to each individual (e.g., innate ability) and time-varying factors that affected the employment/wage outcomes and were common to both the treatment and control groups (e.g., economic conditions). Using this approach, the trends in the employment/wage outcomes of individuals in the matched control group would serve as a counterfactual for that of participants in the treatment group, thereby allowing us to estimate the causal impact of the post-diploma FQ. Specifically, the following equation is estimated for each cohort of ACET post-diploma FQ participants:

5 *For each cohort, the PSM algorithm was implemented using data in the year prior to the commencement of the ACET post-diploma FQ course (e.g., for the 2019 cohort, data from 2018 was used to identify a suitable control group). The following characteristics were used for the matching: gender, ethnic group, age, highest educational qualification, marital status, residential status, employment status, average monthly wages and number of months worked (conditional on employment).*

6 *Post-diploma FQ courses are generally conducted on a part-time basis, and participants can be employed while taking the course.*

$$Y_{it} = \beta_{pre} \cdot Treat\_Pre_{it} + \beta_{study} \cdot Treat\_Study_{it} + \beta_{grad} \cdot Treat\_Grad_{it} + \alpha_i + \delta_t + \varepsilon_{it}$$

Where:

- Y_{it} denotes the outcome of interest (i.e., log of average monthly wages, or dummy variable for employment) for each individual i in time t
- $Treat\_Pre_{it}$ is a dummy variable that takes on a value of 1 for treated individuals (i.e., individuals who obtained the post-diploma FQ) during the pre-treatment period (equals to 1 if the observation refers to a treated individual and time t is between two years prior to the commencement of the course and the earliest year in the time period of the administrative data used (i.e., 2010), 0 otherwise)
- $Treat\_Study_{it}$ is a dummy variable that takes on a value of 1 for treated individuals during the period of the course (equals to 1 if the observation refers to a treated individual and time t is between the year of commencement of the course and the year before graduation, 0 otherwise)
- $Treat\_Grad_{it}$ is a dummy variable that takes on a value of 1 for treated individuals during the post-graduation period (equals to 1 if the observation refers to a treated individual and time t is between the year of graduation and the last year in the time period of the administrative data used (i.e., 2020), 0 otherwise)
- α_i refers to individual fixed effects
- δ_t refers to year fixed effects
- ε_{it} refers to the error term

The coefficients of interest are β_{study} and β_{grad}, which reflect the average impact of the ACET post-diploma FQ on employment and wages during the course and after graduation respectively.[7]

On the other hand, the coefficient β_{pre} indicates whether the trends in the outcomes of interest among the treatment group and matched control group were similar in the period before the commencement of the ACET post-diploma FQ course. If the trends were not similar, the difference-in-differences approach may not be valid as the measured impact could be biased by underlying differences in how the outcomes were trending across the two groups prior to treatment. An examination of the β_{pre} coefficients shows that the treatment and matched control groups generally exhibited similar trends across most cohorts, suggesting that the difference-in-differences approach is largely valid for this study. The only exceptions were the 2012 and 2019 cohorts, where differences in the pre-treatment wage trends of the treated groups compared to their respective control groups were detected. Given that the wage results for these two cohorts could therefore potentially be biased, we exclude them in the next section.

RESULTS

We find that completing an ACET post-diploma FQ improved the employment and wage outcomes of local employees.

Specifically, we find that the post-diploma FQ increased the likelihood of employment of participants both during the course and after graduation. Compared to their respective matched control groups, post-diploma FQ participants from the 2012 to 2019 cohorts were 2.6pp to 10.3pp more likely to be employed during the course, and 3.0pp to 8.3pp more likely to be employed after graduation.

Our study also finds that the post-diploma FQ led to an increase in wages. Compared to their respective matched control groups, post-diploma FQ participants enjoyed real monthly wages that were between 6.8 per cent (which translates to approximately $340) and 16.8 per cent ($840) higher on average during the course. Upon graduation, the real monthly wages of the post-diploma FQ graduates were 4.6 per cent ($300) to 10.8 per cent ($540) higher on average than the wages of their respective matched control groups.[8]

7 *As the omitted period is the year before the commencement of the post-diploma FQ course, the coefficients should be interpreted relative to the year before course commencement. In addition, since the administrative dataset used only contains data from 2011 to 2020, the length of the post-graduation period was shorter for later cohorts. Correspondingly, the β_{grad} coefficient measures the post-graduation impact over a shorter horizon for these cohorts.*

8 *The wage results both during the course and after graduation exclude the estimates for the 2012 and 2019 cohorts given that the pre-treatment trends in their wage outcomes differed from that of their respective control groups. For the remaining cohorts, only statistically significant estimates are reported.*

CONCLUSION

In conclusion, our study finds that the ACET post-diploma FQ was effective in improving the employment and wage outcomes of participants, as participants were more likely to be employed and saw higher real monthly wages both during the course, as well as after graduation. This suggests that the ACET post-diploma FQ has been successful in equipping mid-career adults with the skills that are valued by employers.

Going forward, the Singapore Government will continue to invest in upskilling and reskilling Singaporeans so that they can stay economically competitive and employable throughout their working lives. For example, Singaporeans aged 40 and above who wish to pursue an ACET post-diploma FQ for substantive reskilling can receive 90 per cent course fee subsidies from SkillsFuture Singapore, and also further offset their out-of-pocket course fees using the $4,000 SkillsFuture Credit (Mid-Career) top-up that was launched in May 2024 under the SkillsFuture Level-Up Programme. In turn, Singaporeans are encouraged to step forward to take advantage of the various opportunities available to deepen their skills or to reskill for better jobs.

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