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The relationship between school-based career education and subsequent incomes: empirical evidence from Japan

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Abstract

Students' career paths in Japan have greatly changed due to macroeconomic factors and the fact that young people are increasingly opting not to participate in the labor force. The need to provide education fostering motivation and qualities required for students' future social and vocational independence has emerged. The government-promoted career education policies have become established as one of the pillars of youth employment policy.

This study explored the effects of career policies in school settings by identifying graduates' earning capacity (annual income) through an online survey followed by quantitative analysis of the results. We report the evaluation of career policies by respondents, and then measure the effects of these policies on both labor participation and income. Although the specific program we focused on did not show clear effects, career education policies in general, and daily activities in elementary and middle schools affect graduates' incomes. We also identify other key attributes that influence income.

1. Introduction

With recent changes in Japan's economic structure and employment environment, students' career paths have changed significantly. In the 1990s, Japanese-style employment practices, based on lifetime employment and seniority-based wages began to deviate from their historical norms in response to an economic downturn. Companies began to suppress the hiring of new, full-time graduates to control the number of full-time employees. Since young people were not able to find the job they desired, their incentives to work decreased[1] and an increasing proportion of this younger generation remained unemployed, compared to pre-1990 levels[2]. Figure

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[1] Cabinet Office (2003)

[2] Unemployed young people refers to people aged 15 to 34 who are not in the labor force, nor homemakers, nor

1 shows the mid-term trend in the percentage of people not in the labor force. This rate has gradually increased due to a significant increase in the ratio of people categorized as "other", which denotes people who are not in the labor force except that of home keepers and students. The proportion of people in these latter two categories (home keepers and students) has decreased over time; hence, the reason behind the net increase in people not in the labor force is smaller than the increase observed in the "other" category. Figure 2 shows a shorter-term trend of those not in the labor force, this time focusing just on young people (aged 15 to 34). Less and less young people are getting the chance to determine their pathways in society.

(Figures 1.1 and 1.2 here)

The increase witnessed regarding the young non-employed may reflect changes in their decisions and preferences versus whether or not to participate in the labor force as well as the sluggishness of the economy. In 2012, 20 percent of students graduating from college and 10 percent of students graduating from high school were neither employed nor continuing to further or higher education.[3] Students who terminated education at junior high school (middle school) represent only 8 percent of all young people, but they make up 20 percent of the Not in Education, Employment or Training (NEET) population, according to a Cabinet Office survey[4].

With the background described above, the need to incorporate education fostering the motivation and qualities required for students' future social and vocational independence (career-oriented and vocational education, hereafter referred to as career education) in the school curriculum has emerged. The Ministry of Education, Culture, Sports, Science and Technology (MEXT) advocated the promotion of career education in the 1999 Central Council for Education report "On Improving the Connection between Elementary and Secondary Education and Higher Education." Later, it introduced various measures to expand career education actively (discussed in Section 2). After several policies were implemented, as of 2012, people responsible for career education are deployed in about 80 percent of elementary schools, and in nearly all middle and high schools; further, 50 percent of elementary schools and 80 percent of middle and high schools instituted annual guidance plans for career education.[5] Additionally, in 2012, 98.0 percent of students in public middle schools had undertaken work experience placements; while the completion rate of internships in high schools was 79.8 percent[6]. Opportunities to cultivate reason and motivation aimed at students' future vocational independence are increasing.

Whether career education in the school curriculum has achieved its goal has not been established in Japan thus far. There is an insufficiency of research that documents how helpful (or unhelpful) it is to graduates. Although Recruit (2009, 2011, 2013, 2015, 2017) consecutively

students.
[3] Ministry of Health, Labour, and Welfare (2013b)
[4] The Ministry of Education, Culture, Sports, Science and Technology (2006)
[5] National Institute for Educational Policy Research (2013a)
[6] National Institute for Educational Policy Research (2013b)

surveys teachers if they feel career education is helpful for students, Recruit did not ask students directly how valuable it was for them. Yamaoka (2009) suggested positive outcomes of career education from labor and vocational perspectives; however, whether or not it is effective has yet to be determined.

Based on a postal survey targeting young people nationwide and aged between 23 and 27, the Japan Institute for Labor Policy and Training (2010) suggests it is possible that respondents' evaluations of career education influence their employment status and income. This study, however, does not perform quantitative analysis of the data obtained. From a quantitative analysis of an online survey targeting high school and vocational school graduates nationwide and aged 17 and 27, Ariga (2012) revealed that school characteristics and job placement services in high schools, along with students' academic performance and social skills, influence job market outcomes immediately after school. This study differs from the work we present here in that it does not focus specifically on the analysis of career policies.

Using quantitative analysis of survey data, this study aims to clarify effects of career education issued in 2004 as "Youth Independence Challenge Plan" (see Section 2). We used respondents' recognition of the career policy as a proxy for the "input of career education"; we aim to determine whether this input affects respondents' annual incomes.

Next, in Section 2, we provide a brief history of Japan's education policies; Section 3 reviews relevant existing literature in this domain; Section 4 presents methodological details and results; and, finally, Section 5 ends the paper with discussion and conclusions.

2. Japanese Career Education Policies

Japanese career education in schools has its roots in vocational guidance provided during the 1920s with a social policy orientation (Ishioka, 2007). In the wake of a 1925 notification from the Japanese central government, local governments acted in concert with school officials to develop and secure employment placements for the youth of the country to meet the demands of the laborers (Yamooka, 1998). The background was far different from today, and the number of young laborers that left their villages looking for jobs in large cities steadily increased in the interwar era (Takase, 1998).

Schools have been providing contemporary career guidance regarding students' advancement to continuing education and employment. However, until the end of the 20th century, such guidance only covered students in middle and high schools, and most career guidance was called exit guidance, in other words, support and guidance for passing entrance and employment exams. When lifetime employment and employing new graduates was the norm, students attained vocational independence within the company that hired them, and simultaneously, the familial and communal organizational culture of Japanese enterprises encouraged social self-reliance, and the students grew into "adults" (Komikawa, 2007). As such, although career guidance in schools was

"education for a predetermined destination" (Mochikawa, 2013) to transition from school to society, there were no major issues. However, along with the changes in social conditions, this

"predetermined destination" gradually vanished.

In contrast to career guidance, career education refers to activities that support the transition from school to society. These activities are incorporated in all educational levels, from preschool to elementary, all through middle school, and then high school education.[7] Career education, as it stands today, has its roots in the 1999 Central Council report entitled "Improvements in Articulation between Elementary and Secondary Schools, and Higher Education Institutions." The report suggests that it is critical to deliver career education in a planned manner while emphasizing experiential classes, from the elementary through developmental level.[8] This put the spotlight on career education as one of the pillars of youth employment policy. Moving forward, in 2003, the "Youth Independence and Challenge Strategy Council," composed on four relevant ministers, established the "Youth Independence and Challenge Plan." It cited career education as one of the central elements of the policy. The four politicians involved were the Ministers of MEXT, Health, Labor and Welfare, Economy, Trade and Industry (METI), and, finally, the Minister of State for Economic and Fiscal Policy of the Cabinet Office. Later, the Council established the "Youth Independence and Challenge Action Plan" and in 2006, the "Youth Independence and Challenge Plan" (revised edition). Additionally, "Basic Plan for Education Promotion" in 2008 prioritized career education as "education policy that should be addressed in the next five years."

"Promotion of Education that Cultivates Young Students' Vocation and Labor Perspectives (Research Report)," published by the National Institute for Educational Policy Research Student Guidance Research Center in 2002, explained the basis of career education referencing the 1999 Central Council report. The Research Report classifies four various abilities related to vocational development: ability to (1) form human relationships, (2) use information, (3) plan, and (4) make decisions. The report recommends nurturing these four abilities, for example, through experiences, such as responsible activities in elementary school and work experience and internships in middle and high school.[9] Based on this, specific career education material was formed, with different objectives: exploring the region, investigating jobs of people close to the students, interviewing professionals, and experiential classes in advanced schools.

In January 2011, the Central Council for Education changed the definition of Career Education to "education which encourages career development by cultivating the competencies and attitudes needed to raise the social and vocational independence of individuals" (Fujita, 2016). Then the Council reconfirmed that career education programs should be implemented at all levels of education and that each school's overall educational processes and activities are significant for developing career-relevant skills.

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[7] Ministry of Education, Culture, Sports, Science and Technology (2011)
[8] Ministry of Education, Science and Culture (1999). Though this report is in Japanese, Fujita (2011) introduces it in English along with precise history of Japan's carrier education policies.
[9] National Institute for Educational Policy Research (2002)

3. Previous Studies

Effects of career education policies are hard to measure quantitatively, and researchers have hitherto set various factors as outputs in attempting to do so. We set people's annual income as an output, because it not only represents people's lives (their options, opportunities and their wellbeing to the extent that it is a function of income) but also serves the welfare of the nation through contributing to national income.

3.1 Income as an Output of Education

We selected earning capacity, specifically current annual income (log transformed), as an indicator to measure career education achievements. We posit the hypothesis that career education helps people earn more.[10]

Griliches (1977) discusses the widely used education function:

$$y_i = \ln Y_i = \alpha + \beta S_i + X_i \delta + u_i \tag{1}$$

where y is a measure of income, earnings, or wage rates, S is a measure of schooling, usually in units of years or grades completed. X is a set of other variables assumed to affect earnings; u is an error term, representing other factors that affect earnings but are not explicitly measured[11] and is assumed to be distributed independently of the Xs and possibly of S; and i is an index identifying a particular individual in the sample. His assertion is that equation (1) suffers from estimation bias, and we should instead adopt a simultaneous equations approach, for instance:

$$Y = p_h H e^u \tag{2}$$
$$H = e^{\beta S} \cdot e^v \tag{3}$$
$$y = \ln Y = \ln p_h + \beta S + u + v \tag{4}$$

where p_h is the market rental price which may vary over time and space, H is the implied unobserved quantity of human capital, while u denotes other random influences on wages.

Equation (3) is an implicit production function for human capital with time spent in school (S) as the primary input and other human capital augmenting influences such as differences in the quality of schooling, or differences in the efficiency (ability) with which the time in school was spent by different individuals, represented by the v variable. Griliches (1977) states that "Most of the issues of 'ability bias' and simultaneity can be discussed regarding the content of the u and v variables

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[10] A better gauge of ability may have to be measured by lifelong income. However, because the history of career policies is relatively short, we selected current income to examine the policy effect.

[11] He states that for income, wage rates per hour or per week is more appropriate than income per year which confounds market transactions with issues of labor-leisure choice and the more transitory effects of unemployment. We use respondents' incomes per year, and discuss the problem later.

and the relationship of *S* to them," and he used a two-stage least squares approach.[12]

Many studies have estimated the effect of education on earnings or income, dealing with these biases. Gaston and Sturm (1991) treat schooling as a continuous variable and estimate selection bias-corrected earnings equations for young Australians. They found the biased estimates give from 3.0 to 3.6 percent higher returns of education (earnings.) Using sample data constituted by twins to eliminate endogeneity bias, Ashenfelter and Krueger (1994) show that an additional year of schooling increases wages by 12–16 percent. Angrist and Krueger (1991), taking each student's birth quarter as the instrumental variable, estimated the effect of attendance mandated by compulsory schooling law on their subsequent earnings and found that an additional year of obligatory schooling increases earnings by about 7.5 percent. Harmon and Walker (1995) also used the instrumental variable method (IV), complemented by a selectivity model approach; they measured the rate of return to schooling at about 16 percent. Kane and Rouse (1995) estimated returns to postsecondary education and found that forgone earnings are approximately equal between two- and four-year college graduates when they control the ability and background of the students. Card (2001) provides informative reviews of the literature that has attempted to measure the causal effect of education on labor market earnings using institutional features on the supply side of the education system as exogenous determinants of schooling outcomes. His review includes, other than Angrist and Kruger (1991), Harmon and Walker (1995), and Kane and Rouse (1995), early versions of Staiger and Stock (1997), Card (1995), Conneely and Uusitalo (1998), Ichino and Winter-Ebmer (1998), Lemieux and Card (2001), Meghir and Palme (1999), Malucchio (1998), and Duflo (2001).

Other studies contribute to the literature on the relationship between the education and labor, or earnings, from other respects. Alam and Mamun (2016) indicated a feedback effect between educational attainment and labor market status. They applied a simultaneous system of two-equations model and found the effects of achieving a higher educational attainment on the probability of being employed have been statistically significant, and the effect is negative in the labor market equation. Focusing on a university in Australia, Koshy et al. (2016) examine the impact of various factors on university graduate earnings, including institutional factors. They found limited evidence for an earnings premium associated with the university attended.

3.2 Difference-in-Differences Approach to Measure Policy Effects

Strictly speaking, to isolate policy effects, the same people should be tested at the same time comparing "with" and "without" policy alternatives. Since we are never able to implement the test in the real world, we instead adopt a second-best and quasi-experimental method, i.e., a difference-in-differences (DID) estimation. We compare trends in income among those who graduated from strategically targeted schools to trends in income among a comparison group who graduated from other schools.

DID has been applied to a broad range of economic issues. To name a few in education,

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[12] Griliches (1977) pp.3-4

Hampf and Woessmann (2016), followed by Hanushek et al. (2017), compared the effect of vocational and general education on employment over the life cycle. The results are impressive because an initial employment advantage of individuals with vocational compared to general education turns into a disadvantage later in life, especially in apprenticeship-oriented countries that provide the highest intensity of industry-based vocational education. Oosterbeek et al. (2010) analyze the impact of a leading entrepreneurship education program on college students' entrepreneurship skills and motivation. Their results show that the program does not have the intended effects: the effect on students' self-assessed entrepreneurial skills is insignificant, and the effect on the intention to become an entrepreneur is even adverse.

Beyond career education, many studies use DID in the field of education. Leer (2016) estimates the effects of decentralization on educational outcomes in Indonesia; there was no overall effect on the achievement, but a negative effect on teacher effort, particularly in that of rural areas, and among schools with inactive school committees. Walker and Zhu (2008) estimated the college wage premium using DID with quantile regression. While labor supply exceeded demand in the UK, they found no significant fall in the premium for men and even a sizable, but insignificant, increase for women. Their quantile regression results reveal a fall in the premium only for men in the bottom quartile of the distribution of unobserved skills. Jakubowski (2010) tested the robustness of findings presented in the seminal work by Hanushek and Woessmann (2006) who claimed, through an international DID analysis, that tracking or ability grouping of students has a negative impact on educational inequality, and, at least, no positive effect on average performance. Jakubowski demonstrated the robustness checks of Hanushek and Woessmann method and found that there are crucial differences between the data of PIRLS, TIMSS, and PISA[13] that could bias the results obtained from the DID, difference-in-differences method (country level DID), and then he conducted micro (student) level DID. With data limited to native students, who were in modal grades, and of the same age, the results changed markedly. He found no evidence of a negative impact of tracking neither on mean performance nor on educational inequality.

4. Survey and Results

During March 30 and April 01, 2013, with the help of Nikkei Research Inc., we conducted an online Survey on Vocation-related Education in School,[14] targeting 16- to 31-year-olds living in Japan, and no longer in school. We limited the upper age to 31 to compare the generation before and after receiving career education policies. The response rate was 23%; 3,068 valid responses were captured. We inquired about whether career education obtained in elementary, middle, or high school was helpful for forming their current careers; respondents'

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[13] Progress in International Reading Literacy Study (PIRLS) and Trends in International Mathematics and Science Study (TIMSS) are international surveys managed by the International Association for the Evaluation of Educational Achievement (IEA), and Programme for International Student Assessment (PISA) is a project of the Organization for Economic Cooperation and Development (OECD).

[14] The survey is funded by the National Graduate Institute for Policy Studies, Japan.

current incomes and socio-demographic characteristics were also elicited. Before distributing the online survey, we convened two focus group sessions ($n = 6$ in each session). We then piloted the survey ($n = 235$; response rate = 28%) to identify ambiguities and missing information.

Our analysis is twofold. First, we quantified the differences between people exposed to school-based career education programs designed by the government and those that were not. This quantification is a policy effect analysis based on the DID method. We clarify policy effects of the government's "Career Education Promotion Region-Designated Project (FY2004–2006)" and career education policies in general from the perspective of whether they influenced graduates' earning capacity. Second, we considered that those who remember taking career programs had experienced career education policies. We also included qualified daily activities as explanatory variables.

4.1   Respondents' Attributes

This section introduces respondents' attributes and attitudes toward career education. We start from socio-demographic characteristics, then consider how useful career activities have been for respondents as well as their expectations of career policies.

4.1.1 Socio-demographic characteristics

Among the 3,067 respondents, 45% are male, and 55% are female. Females thus had a higher propensity to complete the survey given that 51% (49%) of the national population is male (female) as of March 2013.[15] Our respondents' age distribution is somewhat concentrated in the 25–29 range, as in Table 1.

(Table 1 here)

Our targeted respondents are those who are not attending school, and their jobs are shown in Table 2. Nine and a half percent of respondents were not in the labor force nor classed as homemakers ("Other" in Table 2); this is higher than the national equivalent.

(Table 2 here)

Parents' education affects children's education. Table 3 displays respondents' education and their fathers' and mothers' education and those categorized by labor participation status. Note that education here is represented by the "standard" school leaving age. We grouped respondents who left education after high school, a specialized training college equivalent, or less, into "18" regardless of their actual age of leaving. When the highest education level is junior colleges, upper secondary specialized training school or equivalent, then "20"; university equivalent is "22"; and graduate school is "24" however long the respondents stayed in graduate school.

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[15]   Ministry of Health, Labour and Welfare (2013a)

(Table 3 here)

The dependent variable, respondents' own income, is a function of education and gender (Figure 2). Education is represented by respondents' standard school leaving age just as in Table 2. The higher the education, the more they earn. In every educational category, females make less than males on average. We will control for these factors (education and sex) later in the subsequent analysis.

(Figure 2 here)

4.1.2 Usefulness

We measured how respondents evaluate career education activities provided in elementary school, junior high school, and high school. The activities include job shadowing or interviews with workers, as well as more regular, daily activities such as being a leader or coordinator of school-based events.

Respondents who experienced these activities expressed how beneficial they are to themselves in aggregated options 1 and 2 to "Useful," and choices 4 and 5 to "Useless" (Figures 3–5; diffusion indices, calculated as the average percentage of "Useful" minus "Useless," are in parentheses).

According to Figure 3.1, respondents do not seem to value specialized career education activities in elementary schools. Instead, they feel that daily classroom activities and experiences are valuable, such as harmonious interactions and helping others. In middle school (Figure 3.2), seven out of nine career activities including "Field trip" and "Job shadowing" are considered useful. All the career education activities directly connected to the workplace are popular (DI > 0) in high school (Figure 3.3), with "Internship" being considered most useful.

From these descriptive statistics, we observe that coordinating, between being a good team player and being a leader, are useful for respondents. Helping others is evaluated as being more useful than being a leader. The importance of everyday activities that nourish general social skills should be emphasized. Simultaneously, programs of career education activities connecting to the workplace in elementary and middle schools exhibit much room for improvement.

(Figures 3.1–3.3 here)

4.1.3 Expectations

In the question asking when respondents' should have started thinking about jobs, about 15 percent answered that this occurred when they had been in "elementary schools (Age 6–12)" (Figure 4). Middle schools (Age 12–15) is the most common time that respondents think schools should let students think about jobs, except for those with a graduate school education who tended to prefer university (Age 18–22) in this respect.

(Figure 4 here)

Respondents do not think middle school career education activities have been useful for them, but they wish they could have started thinking about jobs during middle school. Their impressions suggest the potential for government intervention and direction to improve the program at the middle school level.

Figure 5: "What respondents think they should have been taught during compulsory education" provides useful information. Therein, respondents state that pondering one's future and workplace experience should have been prioritized better, on average. Of note, homemakers are more likely to feel the need for workplace experience compared to other respondents. In Japan, a certain percentage of woman believe they should be homemakers before they start thinking about getting jobs,[16] and the responses tend to suggest that their decisions may have been different if they had benefited from workplace experience.

(Figure 5 here)

We also asked respondents' to identify school-level requirements. As Table 4 shows, respondents think that elementary school students should learn that there are various kinds of jobs and that they do not have to learn deeply about each job. In junior high schools, students should learn to know about many jobs in general, and one job in detail. More than half of respondents consider visiting workplaces important. In high schools, respondents think students should learn about a specific job, rather than many kinds.

(Table 4 here)

4.1.4 Influences

Influences that have helped determine respondents' current life situations are listed in Figure 6. Career education, especially specific vocational education, does not seem to play much of a role in explaining and understanding respondents' lives. Interestingly, what affects them most are their families and friends. The existence of role models is relatively vital to professionals and freelancers.

(Figure 6 here)

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[16] According to a public opinion survey by the Cabinet Office (Cabinet Office, 2014), 46.5% of men and 43.2% of women think "husbands should work outside the home while wives should make home." Limiting to unmarried woman, 32.3% agreed with this statement, which is still a sizeable proportion. Overall, this reflects Japan's long-established sense that married woman should occupy themselves in making a home.

4.2 Effect of Career Education Policies

In this section, we analyze the effect of government' career policies using econometric methods.

4.2.1 Methods

We use the value of respondents' annual incomes as the dependent variable. Since some of the respondents do not search for jobs (because they either become homemakers, willingly choose not to work, or gave up searching for jobs), we applied Heckman's (1974) method to reveal the effects of career education policy. We assume the policy affects both the decision of respondents' to participate in the labor force and their income levels.

We set 10 models (Table 6). Models 1–6 use a differences-in-differences approach to measure the effect of the career education policies enshrined in the "Career Education Promotion Region-Designated Project" which was initiated in 2004. Since we can identify regions and names of schools which participated in that program from Miyake et al. (2006), we asked respondents whether they graduated from those schools or not. The estimation is expressed as

$$y_i = \ln Y_i = \alpha + \beta_1 S_{Post,i} + \beta_2 S_{School,i} + \beta_3 (S_{Post,i} \cdot S_{School,i}) + X_i \delta + u_i, \quad (5)$$

where $\quad S_{Post}$ = The age group who had been in schools in 2004 and after (age under 27)

$\quad S_{School}$ = Those who graduated from the school that the policy has provided.

Then, the difference-in-differences estimate is β_3. (Policy School & Post Policy $\alpha + \beta_1 + \beta_2 + \beta_3 + X_i \delta$ - Policy School & Pre Policy $\alpha + \beta_2 + X_i \delta$) - (Other School & Post Policy $\alpha + \beta_1 + X_i \delta$ - Other School & Pre Policy $\alpha + X_i \delta$) = β_3.

For *X* in equation (5), the explanatory variables for *Income*, we chose *Female*, *Married*, *Female*Married*, *Experience*, *Unemployed*, and *Education*. Here respondents' education (*Education*) is endogenous. Therefore, we chose respondents' parents' education to explain respondents' education because parents' education does not directly affect respondents' incomes, only indirectly through respondents' education. This education variable comprises four groups formed on the standard age of graduation from one's highest educational establishment. Then the endogenous variable is explained using an ordered probit model.

Models 3–6 are concerned with respondents' willingness to participate in the labor force. The following simultaneous equations explain fundamental tenet of our estimation, based on Heckman (1979):

$$Y_i = S_{Yi}^{\beta_Y} \cdot Labor\_participation_i \cdot e^{u_i} \qquad (6)$$

$$Labor\_participation_i = e^{\beta_P S_{Pi}} \cdot e^{v_i} \qquad (7)$$

$$y_i = \ln Y_i = \ln S_{Yi}^{\beta_Y} + \beta_P S_{Pi} + u_i + v_i \qquad (8)$$

where $S_{Yi}^{\beta_Y}$ is which may vary over time and space, *Labor_participation* is a dichotomous variable that takes one when respondents participate in the labor force and zero otherwise.[17] Here *u* and *v*

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[17] Based on the International Labour Organization (ILO) international statistical standards, the population of working age (15 and over) in a country is classified into three groups: people in employment, unemployed people,

denote random influences on income and labor participation, respectively. When we use

Heckman's sample selection model, we assume that both error terms are normally distributed with mean zero;

$$(u, v) \sim N(0, 0, \sigma_u^2, \sigma_v^2, \rho_{uv})$$

where ρ_{uv} is the correlation coefficient between u and v. Besides, we set an assumption that the variance of the error term in the probit regression be one, i.e.,

$$Var(v) = \sigma_v^2 = 1 .$$

Model 3 treats the labor participation decision as exogenous and independent of any other explanatory variables. Models 4 and 5 represent a two-part model, where Model 4 estimates factors affecting labor force participation and Model 5 estimates income using only data for those respondents who do participate therein. Model 6 is a Heckman selection model.

Models 7–10 institute changes concerning policy variables in recognition of career education policy in general and the experience of daily activities. Model 7 treats labor participation as exogenous; Models 8 and 9 constitute a two-part model as described above; and Model 10 is the selection model.

In all models that estimate income, since the original data were elicited from respondents using intervals, we applied interval regressions. Interval regression is such that determining income (expressed by $\bar{y}$),

$$\bar{y}_i = \beta_0 + \mathbf{x}_i \boldsymbol{\beta} + e_i . y$$

takes the form of estimation $y_i^{lb} \leq \bar{y}_i \leq y_i^{ub}$ where y^{lb} and y^{ub} specify the lower and upper bound of each interval where each income y lies. In the lowest category, $y_i^{lb} = -\infty$, we only know $\bar{y}_i \leq y_i^{ub}$, and the observation is left-censored. Also in the highest category, $y_i^{ub} = +\infty$, we only know $y_i^{lb} \leq \bar{y}_i$, and the observation is right-censored. Finally, $e.y$ is assumed to be normally distributed with mean 0 and variance σ^2.

4.2.2 Results

Descriptive statistics for our sample ($n = 2,389$) are provided Table 5; the majority of these respondents ($n = 1,944$) are in the workforce.

(Table 5 here)

Table 6 presents our inferential results. Model 1 measures the policy effect by DID without covariates; the policy effect therein is statistically insignificant (the cross term is insignificant.) Model 2 includes valid control variables (unmarried female, married male, married female, education, work experience, and unemployment.) Assuming some latent factors independent of other explanatory variables make the decision whether to participate in the labor

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and people outside the labor force for other reasons. Since our respondents excludes school pupils and all kinds of students, the variable *Labor force* = 1 if respondents have jobs or are unemployed and seeking jobs and 0 if respondents are homemakers or are unemployed but not seeking jobs.

market, we see that the policy has an effect, albeit at the 0.1 level ($P = 0.060$). Model 3 uses the same explanatory variables as Model 2. It assumes, though, respondents' education is endogenous and controls it with their parents' education (education variables here are constructed as index variables of graduation: 18, graduated from high school or lower; 20, two-year colleges; 22, university; and 24, graduate schools.) Here, the covariance of errors of *Income* and *Education* is significantly non-zero (-0.492), thus *Education* is endogenous. In Model 3, the impact of policy becomes slightly more pronounced than Model 2 but is still somewhat tenuous ($P = 0.090$).

Models 4 and 5 constitute the simple two-part model that considers the error terms of equation (6) and equation (7) as independent. Model 4 is the probit and Model 5 is the regression with endogenous variables, and it only incorporates data for those respondents who are participating in the labor force (respondents are neither homemakers nor nonworking respondents who are not searching for jobs.) Therein, the policy effect becomes insignificant. Model 4 reveals that being female (here, marital status and the married female cross term were insignificant) and family members' income both serve to reduce the probability of participating in the labor force. By contrast, altruism and graduating from schools in Tokyo both exert positive effects on this probability. Income is a positive function of married males, work experience, education, and a negative function of unmarried females, married females, and unemployment.

Model 6 is the Heckman selection model. The policy effect therein is not as apparent as Models 4 and 5; labor participation decisions are affected by the same variables as in Model 4. Factors affecting income are also similar to what was revealed by Model 5, but the unmarried female coefficient is insignificant here.

Since the sample size of those respondents who attended policy-enacting schools is small, it is harder by definition to identify statistically significant policy effects. As such we used respondents' recognition of receiving career education as a proxy for general career policy (the dichotomous variable *Recognize_Career_Policy*) Model 7 treats labor participation decisions as exogenous, as per Model 3. Models 8 and 9 constitute a two-part model that assumes the decision to participate in the labor force and income are independent, as per Models 4 and 5. Finally, Model 10, like Model 6, is a Heckman selection model. Recognizing career policy weakly affects income in Models 7–9; in the selection model (Model 10), it weakly affects only the decision of whether to participate in the labor force, with no discernable effect on income. Being a coordinator in middle school and being a leader in elementary school are both associated with higher incomes.

All results suggest that, at least in early adulthood (under 31), a vicious circle of educational disparity is operating in Japan. Parents' education matters to respondents' education and to that of respondents' income. Education does not affect labor participation but concerns income.

(Table 6 here)

5. Summary and Discussion

Since the 1999 Central Council report, career education promoted by the government has become established as one of the pillars of youth employment policy. This study explored the effects of career policies in school settings by examining graduates' earning capacity (annual income) through quantitative analysis based on results from an online survey. As far as the authors know, this is the first attempt to estimate policy effects quantitatively by focusing on career education policy in Japan.

Results showed that the role of specific career education programs is not clear, at least thus far, but that implementing career education policies in schools might increase graduates' annual income, while certain daily activities help students earn more. If students either take coordinating roles in middle school or leadership roles in elementary school, or both, their subsequent incomes may be greater as a result. It means that the original purpose of career education policies such as cultivating the "ability to build human relationships," "ability to utilize information," "ability to plan the future," and "ability to make decisions" should be emphasized along with the vocational programs. We should note, however, that families (parents' education or family member's income) exhibit significant effects on respondents.

In this study, the impact of career education on students' earning capacity was the dependent variable. A fundamental problem in this respect is that no respondents were older than 31; their incomes have plenty of scope for changing in future as they get older. Indeed, it would be ideal if we could capture and compare data on lifelong incomes. Finally, although earning capacity is an essential incentive for work, it is not the only reason why people choose or remain in their jobs. As evidenced by early retirement trends, job satisfaction is also a substantial incentive when working. As such, future research challenges in this domain include the need to understand holistically the interplay between government incentives (career and other policies) and non-monetary workplace motivations such as job satisfaction and sense of self-fulfillment, as well as the more commonly recognized monetary motivation provided through salaries.

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Table 1　Non-Student Population by Age Group

		Ages 16-19	20-24	25-29	30-31	16-31
Authors' Survey		11	668	1,816	572	3,067
	(ratio)	0.4%	21.8%	59.2%	18.7%	100.0%
National	(thousands)	937 *	4,640	6,780	2,987 *	15,345
	(ratio)	6.1%	30.2%	44.2%	19.5%	100.0%

Source: *Survey on Vocation-related Education in School*; Ministry of Health, Labour and Welfare (2013a, 2013c); Statistics Bureau, Ministry of Internal Affairs and Communications (2013).

Notes: Because the Labour Force Survey publishes population only by age group and not by each age, we estimated the population of the 16–19 and 30–31 age groups using the ratio from the population census.

Table 2   Labor Force Status

	Age Group		Non-Students				
				Employed	Unemployed	Not in labor force		
							House-keeping	Other
Authors' Survey	16-31	3,067	2,336	111	620	329	291
(ratio)		100.0%	76.2%	3.6%	20.2%	10.7%	9.5%
Labor Force Survey (thousands)	15-34	20,300	16,220	1,140	2,940	2,010	930
(ratio)		100.0%	79.9%	5.6%	14.5%	9.9%	4.6%

Source: *Survey on Vocation-related Education in School*, Ministry of Health, Labour and Welfare (2013a, 2013c)

Note: Because of the data constraint, we cannot present the results of the 16–31 age group in the Labour Force Survey.

Table 3   Respondents' and Parents' Education

Respondents' Education		Father's Education					Mother's Education				
				N = 2,715					N = 2,766		
	All respondents	18	20	22	24	Total	18	20	22	24	Total
	18 (High Schools Equivalent or Less)	65.7%	4.7%	28.4%	1.2%	100%	72.3%	19.0%	8.4%	0.2%	100%
	20 (Junior Colleges Equivalent)	51.6%	2.8%	41.9%	3.7%	100%	60.0%	25.5%	13.2%	1.4%	100%
	22 (Universities Equivalent)	40.0%	4.7%	50.7%	4.5%	100%	47.2%	26.6%	25.0%	1.2%	100%
	24 (Graduate Schools Equivalent)	33.3%	5.1%	52.8%	8.7%	100%	38.6%	29.4%	29.9%	2.0%	100%
	Total	49.5%	4.6%	42.3%	3.6%	100%	56.6%	24.0%	18.5%	0.9%	100%
	Respondents in the labor force			N = 2,191					N = 2,233		
	(Including unemployed)	18	20	22	24	Total	18	20	22	24	Total
	18	65.8%	5.1%	28.0%	1.2%	100%	72.3%	19.4%	8.1%	0.3%	100%
	20	53.8%	2.5%	40.6%	3.1%	100%	60.4%	23.2%	14.6%	1.8%	100%
	22	40.5%	4.4%	50.4%	4.6%	100%	46.4%	27.2%	25.3%	1.2%	100%
	24	32.3%	5.3%	54.0%	8.5%	100%	37.7%	29.8%	30.4%	2.1%	100%
	Total	48.7%	4.6%	42.9%	3.7%	100%	55.0%	24.6%	19.4%	1.0%	100%
	Respondents not in the labor force			N = 524					N = 533		
	(Excluding homemakers)	18	20	22	24	Total	18	20	22	24	Total
	18	65.6%	3.8%	29.4%	1.1%	100%	72.5%	18.2%	9.3%	0.0%	100%
	20	45.5%	3.6%	45.5%	5.5%	100%	58.9%	32.1%	8.9%	0.0%	100%
	22	37.3%	6.5%	52.2%	4.0%	100%	52.0%	23.3%	23.8%	1.0%	100%
	24	66.7%	0.0%	16.7%	16.7%	100%	66.7%	16.7%	16.7%	0.0%	100%
	Total	52.7%	4.8%	39.7%	2.9%	100%	63.2%	21.6%	14.8%	0.4%	100%

Source: *Survey on Vocation-related Education in School*
Note: Only four answers (18, 20, 22, 24) are listed and "other" and "not available" are excluded in each category.

Table 4   Ideal Workplace Experience in Each School (Multiple choice)

	Ages 6 to 12 (Elementary School)		Ages 12 to 15 (Junior High School)		Ages 15 to 18 (High School)	
	Yes	% to all	Yes	% to all	Yes	% to all
Learn about many kinds of jobs	2,003	65.3%	1,554	50.7%	1,023	33.4%
Learn about one job precisely	511	16.7%	1,728	56.3%	1,631	53.2%
Visit a workplace	678	22.1%	1,601	52.2%	1,775	57.9%

Source: *Survey on Vocation-related Education in School*

Table 5   Descriptive Statistics

		Mean	S.D.	Min.	Max.	N. of Obs.
Dependent Variables						
Income (log) (lower bounds)	Respondents' annual income	5.544	0.525	4.605	7.601	1,710
	(log of 10 thousand yen)	5.549	0.520	4.605	7.601	1,686
(higher bounds)		5.525	0.663	4.595	7.600	2,389
		5.726	0.555	4.595	7.600	1,941
Explanatory Variables						
Policy Variables						
After_policy	Age under 27 =1; 0, otherwise.	0.578	0.494	0	1	2,392
		0.602	0.490	0	1	1,944
Policy_school	Respondents who were in the policy	0.032	0.177	0	1	2,392
	provided schools = 1; 0, otherwise.	0.032	0.177	0	1	1,944
*After_policy*Policy_school*	Cross term	0.020	0.139	0	1	2,392
		0.021	0.144	0	1	1,944
Recognize_Career_Policy	Remember career activities being provided	0.298	0.458	0	1	2,392
	=1, 0 otherwise	0.307	0.461	0	1	1,944
Coordinator_in_Junior_High	Experienced being a coordinator in	0.380	0.485	0	1	2,392
	elementary school = 1; 0, otherwise.	0.384	0.487	0	1	1,944
Leader_in_Elementary	Experienced being a leader in elementary	0.364	0.481	0	1	2,392
	school = 1; 0, otherwise	0.369	0.483	0	1	1,944
Attributes						
Education	Respondents' school leaving age (18, 20, 22,	20.659	2.041	18	24	2,392
	or 24)	20.840	2.025	18	24	1,944
	Respondents' school leaving age = 20	0.074	0.262	0	1	1,944
	Respondents' school leaving age = 22	0.535	0.499	0	1	1,944
	Respondents' school leaving age = 24	0.092	0.288	0	1	1,944
Female	Female = 1; 0, otherwise.	0.570	0.495	0	1	2,392
		0.508	0.500	0	1	1,944
Married	Marital status: Marriied = 1; 0, otherwise	0.292	0.455	0	1	2,392
		0.208	0.406	0	1	1,944
*Female*Married*	Cross term	0.217	0.412	0	1	2,392
		0.115	0.319	0	1	1,944
Educ_f	Father's school leaving age (18, 20, 22, or	19.995	2.068	18	24	2,392
	24)	20.030	2.075	18	24	1,944
	Father's school leaving age = 20	0.044	0.206	0	1	2,392
		0.043	0.203	0	1	1,944
	Father's school leaving age = 22	0.420	0.494	0	1	2,392
		0.426	0.495	0	1	1,944
	Father's school leaving age = 24	0.038	0.190	0	1	2,392
		0.040	0.195	0	1	1,944
Educ_m	Mother's school leaving age (18, 20, 22, or	19.285	1.623	18	24	2,392
	24)	19.336	1.639	18	24	1,944
	Mother's school leaving age = 20	0.241	0.428	0	1	2,392
		0.249	0.433	0	1	1,944
	Mother's school leaving age = 22	0.187	0.390	0	1	2,392
		0.194	0.395	0	1	1,944
	Mother's school leaving age = 24	0.009	0.095	0	1	2,392
		0.010	0.101	0	1	1,944
Experience	Work experience (age minus school leaving	4.597	3.395	0	13	2,392
	age)	5.656	2.861	0	13	1,944
Unemployed	Unemployed and seeking jobs = 1; 0,	0.032	0.177	0	1	2,392
	otherwise.	0.040	0.195	0	1	1,944
Labor_participation	In the labor force =1, 0 otherwise.	0.813	0.390	0	1	2,392
Family_member_income(log)	Family members' total annual income excluding respondents' own income (log of 10 thousand yen)	3.582	2.991	0	7.601	2,392
Altruism	Answers to "Do you think you should help others whatever happens?": Strongly Agree = 5, Agree= 4, Undecided = 3, Disagree= 2, Strongly Disagree = 1.	3.393	0.743	1	5	2,392
Tokyo	Respondents from schools in Tokyo = 1; 0, otherwise.	0.141	0.348	0	1	2,392

Note: For the dependent variable *Income*, the lowest value of the lower bound and the highest value of the higher bound are set to be missing to perform the interval regression in STATA (Ver. 15).

Source: *Survey on Vocation-related Education in School*

Table 6 Results

Policy Variables / Independent Variable	Endogenous Education (1) Income	(2) Income	(3) Income	Two parts model (4) LP	(5) Income	Selection model (6) LP	(6) Income	Endogenous Education (7) Income	Two parts model (8) LP	(9) Income	Selection model (10) LP	(10) Income
				Schools provided the policies — Income estimated from those participating in the labor force				*Recognition of career policy and experience of activities — Income estimated from those participating in the labor force*				
Policy Variables												
After_policy	-0.077* (0.037)	-0.055 (0.045)	-0.056 (0.044)	0.242*** (0.065)	-0.049 (0.048)	0.332*** (0.062)	-0.097* (0.048)					
Policy_school	-0.020 (0.165)	-0.012 (0.121)	-0.000 (0.120)	-0.049 (0.277)	0.018 (0.121)	0.134 (0.261)	0.053 (0.129)					
After_policy*Policy_school	0.309 (0.210)	0.281* (0.150)	0.252* (0.149)	0.030 (0.375)	0.120 (0.150)	-0.116 (0.350)	0.060 (0.162)					
Recognize_Career_Policy								0.061* (0.028)	0.155* (0.071)	0.067* (0.028)	0.137* (0.067)	0.028 (0.031)
Coordinator_in_Middle								0.106*** (0.027)		0.114*** (0.026)		0.111*** (0.026)
Leader_in_Elementary								0.082** (0.027)		0.085** (0.026)		0.072** (0.026)
Attributes												
Female				-0.781*** (0.072)		-0.603*** (0.070)			-0.807*** (0.072)		-0.651*** (0.071)	
Female (not married)		-0.151*** (0.030)	-0.161*** (0.029)		-0.158*** (0.029)		-0.033 (0.032)	-0.181*** (0.029)		-0.179*** (0.029)		-0.046 (0.032)
Married (male)		0.367*** (0.048)	0.359*** (0.048)		0.364*** (0.046)		0.340*** (0.048)	0.336*** (0.047)		0.338*** (0.046)		0.328*** (0.048)
Married Female		-0.551*** (0.063)	-0.533*** (0.063)		-0.500*** (0.062)		-0.390*** (0.061)	-0.512*** (0.062)		-0.477*** (0.062)		-0.392*** (0.061)
Experience		0.022* (0.009)	0.022* (0.009)		0.023* (0.009)		0.024** (0.009)	0.031*** (0.005)		0.032*** (0.005)		0.030*** (0.005)
Unemployed		-1.098*** (0.080)	-1.091*** (0.079)		-1.079*** (0.077)		-0.988*** (0.072)	-1.079*** (0.079)		-1.063*** (0.076)		-0.985*** (0.072)
Family_member_income (log)				-0.112*** (0.012)		-0.092*** (0.010)			-0.113*** (0.012)		-0.095*** (0.011)	
Altruism				0.088* (0.044)		0.062* (0.036)			0.077* (0.044)		0.041 (0.037)	
Tokyo				0.303** (0.100)		0.339*** (0.083)			0.286** (0.100)		0.319*** (0.085)	
Education (20)		0.131* (0.055)	0.356*** (0.072)		0.342*** (0.065)		0.355*** (0.065)	0.369*** (0.072)		0.346*** (0.063)		0.361*** (0.063)
Education (22)		0.346*** (0.042)	0.793*** (0.104)		0.741*** (0.088)		0.789*** (0.090)	0.817*** (0.102)		0.754*** (0.083)		0.792*** (0.086)
Education (24)		0.595*** (0.065)	1.460*** (0.192)		1.336*** (0.161)		1.457*** (0.167)	1.496*** (0.191)		1.346*** (0.156)		1.447*** (0.162)
Constants	5.300*** (0.029)	3.864*** (0.073)	3.550*** (0.103)	1.407*** (0.170)	4.995*** (0.119)	1.219*** (0.146)	5.077*** (0.115)	3.451*** (0.096)	1.558*** (0.164)	4.828*** (0.076)	1.488*** (0.142)	4.917*** (0.074)
Labor_participation		1.436*** (0.082)	1.442*** (0.082)					1.368*** (0.068)				
Ordered probit explanatory variables												
Father's Education (20)		0.243* (0.108)			0.209+ (0.123)		0.254* (0.107)	0.249* (0.107)		0.216+ (0.123)		0.256* (0.108)
Father's Education (22)		0.312*** (0.054)			0.317*** (0.059)		0.321*** (0.053)	0.308*** (0.054)		0.316*** (0.060)		0.319*** (0.053)
Father's Education (24)		0.639*** (0.124)			0.624*** (0.136)		0.649*** (0.121)	0.637*** (0.124)		0.629*** (0.136)		0.654*** (0.122)
Mother's Education (20)		0.273*** (0.058)			0.291*** (0.063)		0.263*** (0.056)	0.269*** (0.058)		0.289*** (0.064)		0.264*** (0.057)
Mother's Education (22)		0.483*** (0.069)			0.504*** (0.075)		0.471*** (0.067)	0.483*** (0.068)		0.504*** (0.075)		0.473*** (0.068)
Mother's Education (24)		0.515* (0.222)			0.453+ (0.241)		0.470* (0.219)	0.531* (0.222)		0.459+ (0.242)		0.491* (0.220)
Ordered probit dependent variable Education (18, 20, 22, 24)												
cut points 1		-0.125*** (0.037)			-0.212*** (0.040)		-0.126*** (0.036)	-0.127*** (0.037)		-0.213*** (0.040)		-0.125*** (0.036)
cut points 2		0.104** (0.037)			0.005 (0.040)		0.103** (0.036)	0.102** (0.037)		0.005 (0.040)		0.104** (0.036)
cut points 3		1.829*** (0.051)			1.748*** (0.054)		1.825*** (0.050)	1.829*** (0.051)		1.747*** (0.054)		1.829*** (0.050)
Variance of error term : Income	0.722*** (0.027)	0.316*** (0.012)	0.382*** (0.031)		0.341*** (0.023)		0.476*** (0.038)	0.379*** (0.032)		0.332*** (0.022)		0.457*** (0.037)
Covariance of error term: Income*Education			-0.492*** (0.082)		-0.432*** (0.076)		-0.505*** (0.062)	-0.500*** (0.083)		-0.427*** (0.076)		-0.494*** (0.064)
Covariance of error term: Income*Labor Participation							-0.828*** (0.032)					-0.808*** (0.032)
Covariance of error term: Education*Labor Participation							0.224*** (0.039)					0.194*** (0.038)
Number of observations	2392	2392	2392	2392	1944	2392		2392	2392	1944	2392	
Non-selected / selected						448	1944				448	1944
Log-likelihood	-4760.1	-3757.1	-6296.1	-999.7	-5639.0	-7071.4		-6282.2	-1004.4	-5619.2	-7066.5	
Bayesian information criteria	9559.2	7623.2	12779.0	2061.5	11452.1	14399.5		12751.0	2055.4	11412.6	14374.2	
Akaike's information criteria	9530.3	7542.2	12640.2	2015.3	11324.0	14208.8		12612.3	2020.8	11284.4	14195.0	
Model degrees of freedom	3	12	12	7	11	11		12	5	11	11	
Chi-square	8.28	1568.66	1382.05	255.94	508.69	429.31		1391.29	246.51	556.37	432.14	
Model significance	0.041	0.000	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000	

Source: *Survey on Vocation-related Education in School*
Note: 1. Standard errors are in parentheses.
            2. +, *, **, and *** denote 10%, 5%, 1%, and 0.1% levels of significance, respectively.
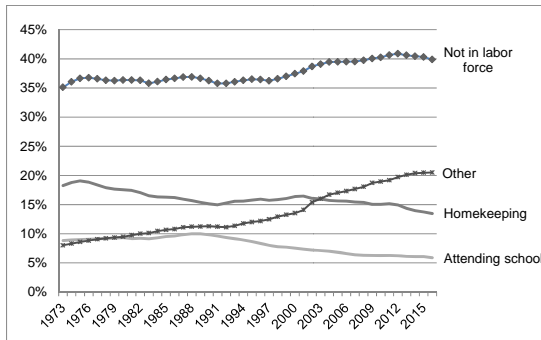
Figure 1.1 Ratio of People who are not in Labor Force
Note: 1. Ratio of the population aged 15 years and older.
         2. "Not in labor force"="Attending school"+"Homekeeping"+ "Other"
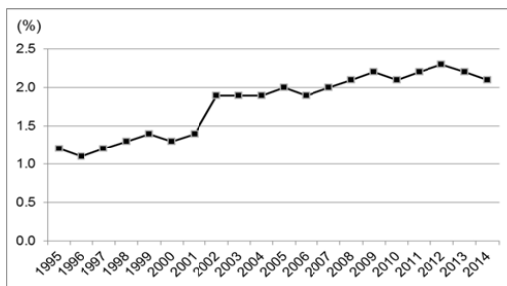Source: Statistics Bureau, Ministry of Internal Affairs and Communications (2017)

Figure 1.2 Non-employed people out of population aged between 15 and 34 years from 1995 to 2014
Source: Modified from Figure 34 (2), "Percentage of non-employed of the population of
        people aged 15 to 34," Cabinet Office (2016, p.16)
Note 1: Non-employed young people means people who are (i) aged from 15 to 34 years, (ii)
        not in the labor force, and (iii) are neither homemakers nor school attendees.
    2: The figures for 2011 exclude those for Iwate, Miyagi, and Fukushima.

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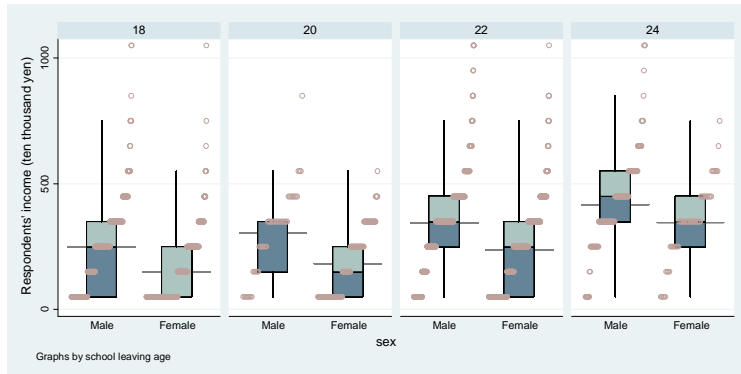
Figure 2 Respondents' Income by Education and Sex
Source: *Survey on Vocation-related Education in School*
Note: The box shows the interquantile range; the top of the upper box is the 75th percentile, the bottom of the lower box is the 25th percentile, the vertical line shows the 1.5 quantile range, the thin horizontal line is the average, and the superimposed dots are the quantile plot.
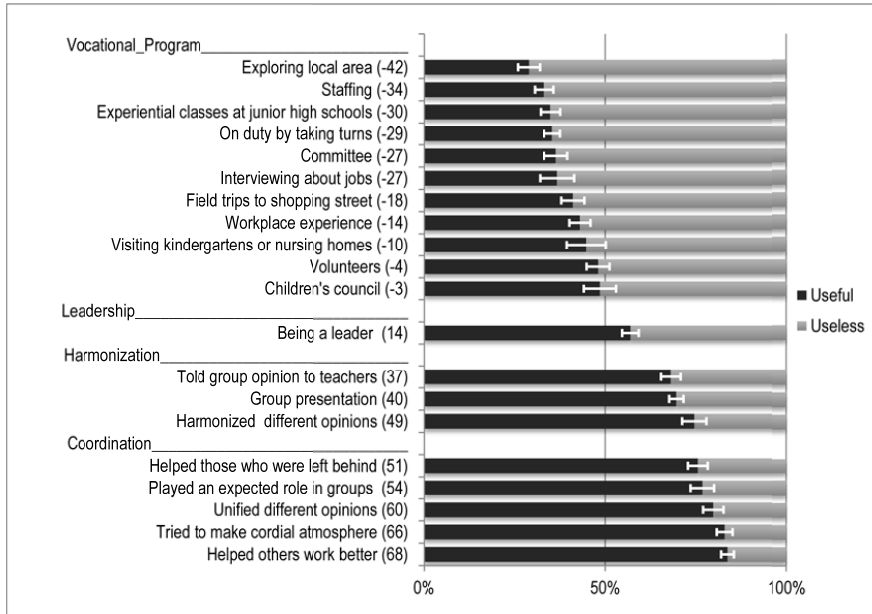
Figure 3.1 Usefulness of career education activities (Elementary school)

Source: *Survey on Vocation-related Education in School*
Note: Diffusion index of average (Useful–Useless) in parenthesis; 95% confidence interval is depicted in each bar.
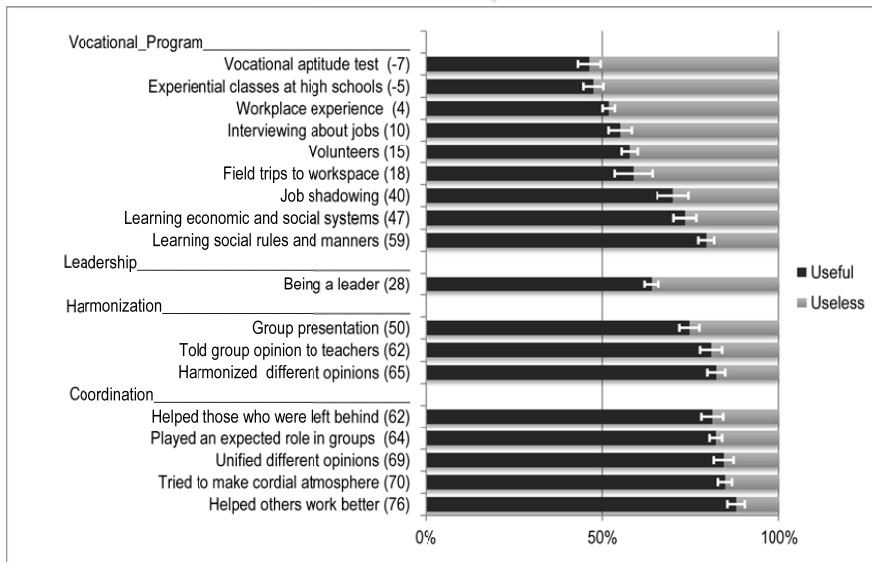
Figure 3.2 Usefulness of career education activities (Junior high school)
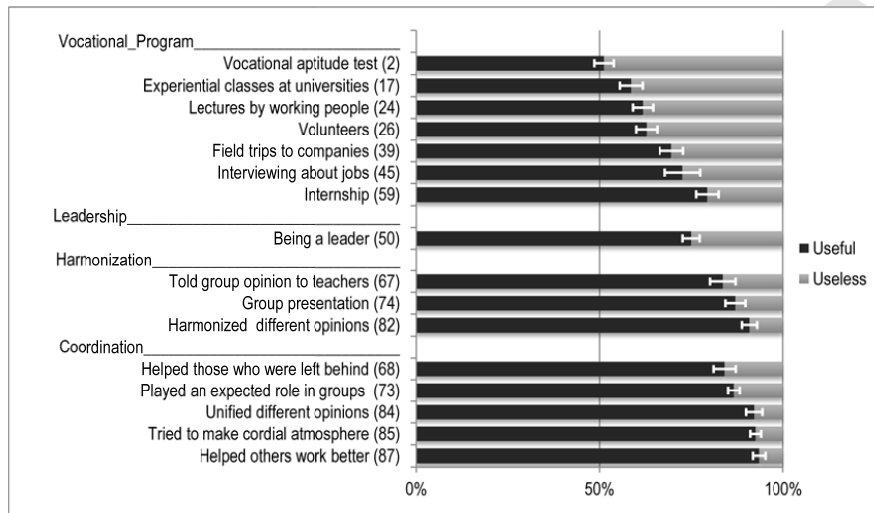Source and Notes: See Figure 3.1.

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Figure 3.3 Usefulness of career education activities (High school)
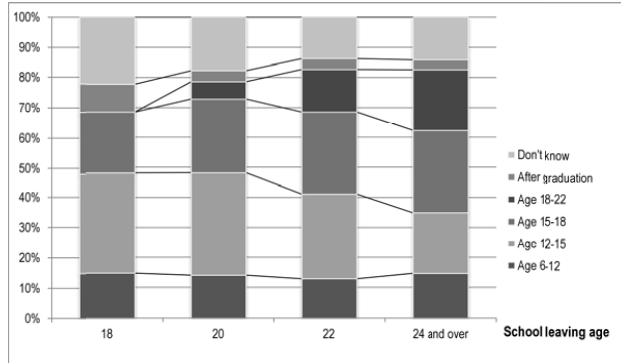Source and Notes: See Figure 3.1.

Figure 4. When the respondents think they should have started thinking about their jobs, by school leaving age
Source: *Survey on Vocation-related Education in School*
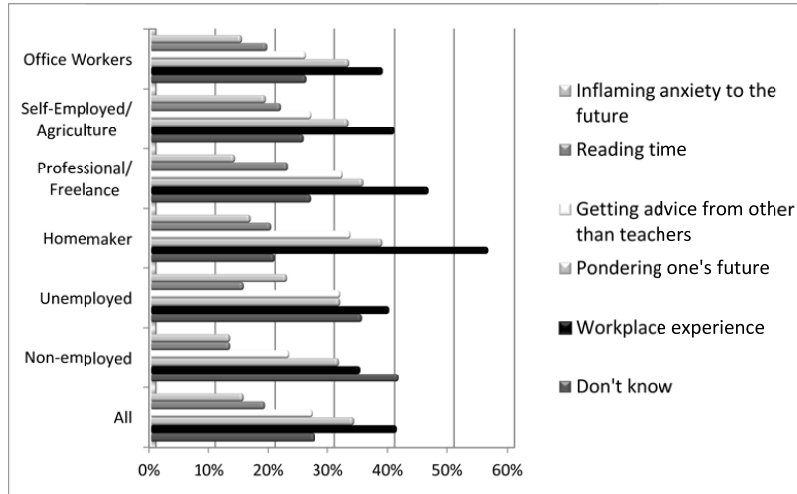
Figure 5. What respondents think they should have been taught during compulsory education, by profession (Multiple choices)
Source: *Survey on Vocation-related Education in School*
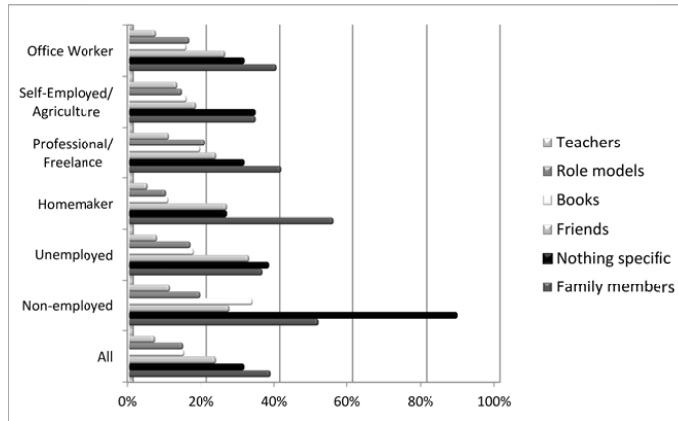Note: Non-employed represents those who are not in the labor force and are not homemakers.

Figure 6 Things that affected respondents, by profession (Multiple choices)
Source: *Survey on Vocation-related Education in School*

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