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ABSTRACT

This article explores the following questions: first, "Do colleges of higher vocational education vary in the mean success of their graduates on the labor market?" and, second, "Are the differences between these colleges stable over time?". The analysis drew upon school effectiveness, quality assurance and labor market research. The school effectiveness literature shows that schools differ in the educational output of their students. The relationship between the organizational context and structure and the paradigms of these colleges affect the quality of the outcomes of educational policy. The leading assumption in human capital theory is that since education makes people more productive, education is an investment in human capital. An annual survey of graduates of colleges in the Netherlands collects information about destination, labor market entry, unemployment spells and the jobs held by graduates. Statistical analysis showed: (1) systematic differences between departments and colleges in the labor market outcomes of their graduates even after controlling for student and regional factors, (2) stable department effects with respect to the length of unemployment and job level; (3) difference between the net and gross quality indicators of a department; and (4) no correlation between a department's improving graduates' chances of finding work and the quality of work. (Contains 33 references.) (CK)

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Do colleges have an effect on the labour market success of their graduates?

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Do colleges have an effect on the labour market success of their graduates?

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- paper for the AERA meeting, april 1996, New York -

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Contents

1 Introduction

In most western countries, a growing interest in educational indicators can be demonstrated. These indicators are used as summary statistics for measuring the quality of the educational system. The use of key indicators enables policy makers and educational authorities to assess the performance of their educational system, by enabling a systematic comparison of the quality of education between countries, between years, between regions, between institutes or between types of education.

This increase of interest in the public reporting and accountability of education is due to the following factors:

* a growing awareness that improvement of the quality of education is necessary to increase Europe's competitiveness on a global market and to face the challenges of the future (c.f. White Paper, 1993; IRDAC, 1990);
* constraints on educational budgets due to higher enrollments, forcing the institutes of education to perform more effectively and efficiently;
* increasing demands from consumers (parents and students) to be informed about the quality of educational institutes.

On an international level, the interest in educational indicators can be demonstrated in projects like the Indicators of Education Systems (INES) project or the Community Educational Indicators Project (CEIP) from the European Commission (West et al, 1995). The EC interest in quality of education is also demonstrated in the Maastricht Treaty on European Union: 'EC shall contribute to the development of quality education....' (article 126, chapter 3) and in subsequent action programmes like SOCRATES and LEONARDO. On a national level, similar projects can be identified, regarding the educational performance on a national level as well as a regional and institutional level (National Council for Education and Training Targets, 1993; Willms and Kerckhoff, 1995; Croxford and Cowie, 1996; Bosker and Scheerens, 1995; Ministry of Education and Science, 1995).

In the Netherlands, quality assessment in higher education has been on the public policy agenda since the publication in 1985 of the paper "Higher Education: Autonomy and Quality" by the Dutch Ministry of Education and Science[1]. This paper marked a change in the administrative relation towards higher education. Instead of a direct control of the contents and quality of higher education, the Ministry placed higher emphasis on autonomy and self regulation for the institutes of higher education (colleges for higher vocational education and universities). This was to be accompanied by a system of quality assurance in which the institutes of higher education give an account of their performance.

1. Ministry of Education and Science (1985), Hoger Onderwijs: Autonomie en Kwaliteit (HOAK-nota).

This system of quality assurance covers all areas of the educational process, such as inflow of students, study progress (internal output), input of staff and other resources, but also business administrative aspects. One of the major issues in the system of quality assurance is the so-called external output of education, that is the success of graduates on the labour market.

One of the basic assumptions of the system of quality assurance is that colleges may differ in their quality. Moreover, one assumes that these differences are caused by organisational or educational factors, rather than differences in student composition or regional differences in the labour market, factors for which the colleges cannot be held responsible. Furthermore one assumes that these differences are systematic and not subject to major variations over time.

In this article we explore the following questions:

1. Do colleges of higher vocational education vary in the mean success of their graduates on the labour market, even after controlling for personal and regional characteristics?
2. Are the differences between these colleges stable over time?

2 Theoretical background

The analysis in this article draws upon three lines of research: school effectiveness, quality assurance and labour market research.

The school effectiveness literature shows that schools differ in the educational output of their students even after controlling for input factors like intelligence, motivation and socio-economic background. These school effects can be attributed to either school, classroom or teacher factors and explain between 9 and 27% of the variance in educational attainment (Mortimore et al., 1988; Brandsma and Knuver, 1989). The effects seem to be larger in primary education than in secondary education (Bosker, 1990). The theoretical models concentrate either on the process of learning and effective instruction (e.g. Creemers, 1992 and 1994) or on the school as an organisation (e.g. Scheerens, 1990). The former puts a heavy emphasis on learning time and opportunity to learn, while the latter emphasises organisational features like strong educational leadership, achievement oriented policy and an orderly and safe climate.

In the leading reviews of the school effectiveness research (e.g. Creemers and Scheerens, 1994; Scheerens, 1993) no mention is made of research into the labour market outcomes. Most of the research concentrates on academic performance or school careers. This, of course, is caused by the fact that most research concentrates on primary education. However, one might argue that differences in the educational output will also

be reflected in differences in labour market outcomes. The school effects in labour market outcomes however will probably be less strong, because of the intervening effects of other factors.

The second line of research which bears relevance for our analysis relates to research into quality assurance and the use of performance indicators in higher education. Quality assurance, planning and resource allocation, particularly during times of financial (governmental) constraints and changing socio-economic demands, involves making choices between mutually exclusive alternatives each with its own combinations of inputs, outputs, outcomes, impacts and benefits (e.g. Segers, 1993). At the one hand the institutions of higher education obtained a greater autonomy with respect to the 'input' and 'process' factors. On the other hand the institutions are being called more and more to account for their 'output'. Effectiveness and efficiency became central concepts: higher education became responsible to 'manage' their institutions by themselves. In this framework it is relevant to mention that De Jager (1994) shows that the relationship between the organizational context and structure, and the 'paradigms' of the higher vocational colleges have an impact on the outcomes of educational policy. These paradigms refer to the pedagogical or professional role of the staff, the educational mission and internal coalition of the college.

Countries like the United Kingdom, Australia and the Netherlands adopted ideas and tools of the American 'accredition system'. In the Netherlands this lead to a nation wide and public quality assurance system of 'visiting committees'. All institutions taking care of a discipline are 'visited' periodically. It is a rolling review process with two complementary phases: internal evaluation by the faculty, reported in a selfstudy report and visitations by external commentators. A checklist, consisting of a set of performance indicators, the operationalization of the dynamic and multidimensional concept of 'quality', is the guideline for the faculty report and the comments of the visiting committee. The relevance of the training with respect to the requirements of the labour market and professional practice are more and more considered as important indicators to judge the quality of a higher (vocational) educational discipline.

The third line of research of relevance here is the labour market research. The leading assumption in human capital and matching theory is that education and training makes people more productive. Following education can therefore be seen as an investment in human capital (Becker, 1975; Schultz, 1961) which increases productive skills and will therefore lead to higher wages. In most research the focus of interest has been on explaining differences between types of education, rather than between institutes of education. A few authors point to the relevance of differences between colleges. Glebbeek (1989) regards education as a production process with an important feature: the variability in outcomes. Unlike most production processes, the output of education is characterised by a large variation in quality. Graduates vary in considerably in acquired

skills and this variation is closely linked to the selectivity of the educational process. Colleges that put high standards in their exams, will produce an output with higher quality and less variation. As employers have no means of assessing directly the productive skills of an individual, this variation in quality produces a considerable risk. Especially in branches in which mediocre functioning of employees produces a high risk (like health care), this could lead to additional educational requirements. Empirical evidence for this relation between the quality of a college and overeducation is given by Robst (1995). In a paper examining the relation between college quality and overeducation, he shows that workers who attended a lower quality college have a higher likelihood of ending up in a job for which they are overeducated. In the Netherlands Van der Velden et al. (1989) has showed that the following factors are relevant for the labour market outcomes: high selectivity during the training, an appropriate match between education and occupation, effective instruction and an active labour market policy.

In this article we restict the analysis to the question whether there are any differences between colleges of higher vocational education after controlling for student and regional factors and leave aside the question to which factors these differences may be attributed. Bearing in mind the results of the school effectiveness literature, we expect only modest differences between colleges in the labour market outcomes. Moreover, we expect these differences to be larger for employment chances than for outcomes which are more institutionally defined (e.g. wages).

3 Data and method

In 1991, the Council for Higher Vocational Education (HBO-Raad) commissioned the Research Centre for Education and the Labour Maket (ROA) to develop an instrument which assesses the success of graduates on the labour market and which could be used in the system of quality control by institutes of higher vocational education. This instrument has been in operation as of 1991. About two thirds of all the colleges make use of this instrument, which makes it the most important instrument for the external quality control.

The instrument consists of an annual survey among graduates of the participating colleges. In this survey, information is collected about destination, labour market entry, unemployment spells and the jobs that the graduates hold. The survey is held one and a half year after graduation.

The participating institutes of higher vocational education receive standard information about the results of their 'own' graduates in confidential institute reports. This information can directly be compared with the national figures for the types of education in question. Apart from this, a national, public report is prepared where the results of the

total outflow of a particular sector of higher vocational education is analysed (see Van de Loo and Van der Velden, 1994)

In this analysis, we use data from the 1991, 1992 and 1993 survey (Van de Loo et. al., 1992; Van de Loo et. al., 1993; Van de Loo and Van der Velden, 1994). This means that the research population consists of graduates from higher vocational education from the following cohorts: 1989/90, 1990/91 and 1991/92. We restrict the dataset to graduates from the largest types of training within the following 6 sectors of higher vocational education: pedagogics, technics, economics, health studies, social studies and fine arts. The selected courses are: teacher training (for primary education), mechanical engineering, business administration, nurse training, social work training and music (teacher) training.

In the analysis we used the following dependent variables: a dummy indicating if the graduate was less than 3 months unemployed during the job entry period ("job entry"), a dummy indicating if the level of the job correponded to the level of higher education ("level of job")[2] and two indicators for income ("gross hourly wage" and "gross monthly wage").

The predictor variables include personal characteristics (sex, age) as well as qualification and skills characteristics like training course in higher vocational education, previous type of education, previous job experience, board experience and length of study. To control for regional and annual (business cycle) variations we include the region where the college was situated, the region of work and year of survey.

Table 1 presents some descriptive statistics. Some 15% of the graduates were more than 3 months unemployed during the period between graduation and the survey. At the moment of the survey 79% held a job which matched their educational level. The gross monthly wages amounted to 2.880 Dutch guilders, while the gross hourly wage was slightly more than 18 guilders on average.

A majority (60%) of the sample used for this analysis is female. The mean age is 25 years. About a quarter of the graduates had board experience before entering the labour market and about one third had previous job experience. Senior general secondary education is the dominant type of previous education, followed by pre-university education and senior vocational secondary education[3].

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2. Zero corresponding with a job level lower than higher education (overeducation).

3. Senior general secondary education (HAVO) has a duration of 5 years after primary education and is supposed to be the main route to higher vocational education. Pre-university education (VWO: duration 6 years) is supposed to prepare for university education, although an important share of its graduates go on to higher vocational education. Senior vocational secondary education (MBO duration 3-4 years) prepares mainly for the labour market although it has an increasing share of graduates following further education.

Table 1
Means (standard deviations) and proportions

	job entry	income & level of job
Dependant variables		
job entry		n.a
- quick (≤ 3 months)	85.3%	
- slow	14.7%	
level of job	n.a.	
- lower than higher vational		20.9%
- at least higher vocational		79.1%
wages per hour (fl)	n.a.	18.29 (4.23)
monthly wages (kfl)	n.a.	2.88 (0.66)
Predictor Variables		
Student level	N_e = 6275	N_e = 4303
sex		
- female	60.0%	62.0%
- male	40.0%	37.8%
preliminary education		
- senior general	46.5%	45.5%
- pre-university	31.1%	31.3%
- senior vocational	19.6%	20.6%
- higher vocational	0.9%	0.7%
- other education	1.9%	2.0%
job experience		
- yes	33.8%	34.0%
- no	66.2%	66.0%
board experience		
- yes	25.2%	25.2%
- no	74.8%	74.8%
age	24.63 (2.05)	24.70 (2.06)
length of study (in years)	4.05 (0.63)	4.03 (0.62)
region of work	n.a.	
- west		48.7%
- north		6.5%
- east		20.7%
- south		22.5%
- foreign		1.6%

Table 1 (continuation)
Means (standard deviations) and proportions

	job entry	income & level of job
year level	$N_y = 223$	$N_y = 223$
year		
- 1991	28.7%	28.7%
- 1992	34.1%	34.1%
- 1993	37.2%	37.2%
department level	$N_d = 97$	$N_d = 97$
study		
- pedagogics	25.8%	25.8%
- technics	18.6%	18.6%
- economics	15.5%	15.5%
- health studies	17.5%	17.5%
- social studies	16.5%	16.5%
- fine arts	6.2%	6.2%
college level	$N_c = 50$	$N_c = 50$
region		
- west	42.0%	n.a.
- north	10 0%	
- east	26 0%	
- south	22.0%	

The number of graduates of higher vocational education is (still) increasing. This is not only the case in this analysis but also in the total amount of this population in the Netherlands. The western part of the Netherlands is both dominant in the educational field, and in the employment. For the northern and eastern regions there is a negative nett migration flow of graduates to this dominant western part in the Netherlands.

A nested design is used consisting of the following levels: student, year, department (sector of college) and the college level. As we selected only one course per sector, the department level coincides with the training course. We restricted the dataset to those graduates who, at the moment of the survey, belong to the labour force (employed plus unemployed). This amounts to a total of 6.275 cases[4]. These were nested in 223 year/department/college combinations. These combinations were nested in 97 department/college combinations and these were again nested in 50 different colleges.

4. For the analysis of job entry the total sample could be used. For the other three analyses the sample was restricted to those graduates who held a job at the moment of the survey. This amounts to 4.303 cases.

The model specification is as follows:

(1) $y_{sydc} = \beta_{0ydc} + \beta_1 SEX_{sydc} + \ldots + \beta_{12} FOREIGN_{sydc} + e_{sydc}$ student-level

(2) $\beta_{0ydc} = \beta_{00dc} + \gamma_1 1992_{ydc} + \gamma_2 1993_{ydc} + u_{0ydc}$ year-level

(3) $\beta_{00dc} = \beta_{000c} + \delta_1 TECH_{dc} + \ldots + \delta_5 ARTS_{dc} + v_{00dc}$ department-level

(4) $\beta_{000c} = \beta_{0000} + \zeta_1 NORTH_c + \ldots + \zeta_3 SOUTH_c + w_{000c}$ college-level

Furthermore it is assumed that $e_{sydc} \sim N(0,\sigma_e^2)$, $u_{0ydc} \sim N(0,\sigma_u^2)$, $v_{00dc} \sim N(0,\sigma_v^2)$, and that $w_{000c} \sim N(0,\sigma_w^2)$, i.e. all residuals are normally distributed with zero mean and some (unknown) variance. By definition the residuals are uncorrelated. Regression and variance component parameters are estimated using maximum likelihood.

For the logistic multi-level regression model, applied to model the binary dependent variables (job entry and level of job) the logistic link function is used (Wong & Mason, 1985). In this case it is assumed that

(5) $(y_{sydc} | p_{sydc}) \sim$ Bernouilli(p_{sydc})

where $p_{sydc} = PR(y_{sydc} = 1)$ is the probability that student s from year y in department d of college c will have a job respectively will have an appropriate job. Instead of y_{sydc} logit(p_{sydc}) will be regressed on the predictors. In this case (1) does not contain a residual, i.e. $e_{sydc} = 0$. Parameters are estimated using quasi-likelihood estimation (Longford, 1993).

The stability of the performance of the departments is estimated by taking the ratio of the between years variance to the sum of the between years and between departments variance:

stability: $\sigma_u^2 / (\sigma_u^2 + \sigma_v^2$

Since the random effects are modelled explicitly, this is the 'true' stability.

The performance indicators than are constructed using 'shrinkage estimators' (e.g. Bryk & Raudenbush, 1992), in which precision weights are used to estimate the department parameters:

$\hat{\beta}^*_{dc} = w_{dc}\hat{\beta}_{dc} + (1-w_{dc})\hat{\beta}^*$

$\hat{ß}$ is the Ordinary Least Squares estimator (in models without predictors this is the mean), w_{di} the precision weight and $\hat{ß}^*$ the Empirical Bayes estimate of the population mean (across the departments and colleges). These precision weights are the ratio's of the true between department level variance relative to the observed between department level variance:

$$w_{dc} = \sigma_v^2 / (\sigma_v^2 + (\sigma_u^2 + \sigma_\bullet^2/n_{ydc})/n_{dc})$$

n_{ydc} is the harmonic mean of the number of students in year y in department d in college c and n_{dc} is the number of years in department d in college c.

The gross performance indicators are constructed estimating the parameters without predictors. The nett performance indicators are constructed estimating parameters in regression models that contain all predictors with statistically significant effects.

4 The analysis

As indicated before, we used a 4-level hierarchical model for the analysis with levels student, year, department and college. For the dummy variables job entry and level of job we adopted a logistic regression approach (see Bosker and Hofman, 1994 for an elaboration). Table 2 presents the results of the 4-level analyses with predictors year of survey and type of training only. The residual outcomes per department of this analysis equates the mean of the 'gross' performance indicators as presented in the so-called confidential institute reports in those three years. The rankings of the departments on the basis of these mean gross outcomes for their graduates are presented in the appendix.

Compared to the situation in 1991 the labour market opportunities for graduates worsened in 1992 and 1993, with significantly lower proportions of graduates who were less than 3 months unemployed. This was not accompanied by a significantly lower level of the jobs acquired, although the negative sign suggests that the proportion of graduates who hold a job below their educational level has grown. The hourly and monthly wages in 1992 and 1993 are significantly above the 1991 level. Between 1992 and 1993 there is a drop in the mean monthly wages, which may be attributed to an increase in parttime work and lower level jobs.

There are significant differences between the types of training in labour market outcomes. Compared to 'teacher primary education', graduates from 'nurse training' show significantly higher proportions of quick job entry while the graduates from 'social services' and 'music teacher' suffer significantly more from unemployment.

Table 2
Results of the (logistic) 4-level analyses. Regressions coefficients and standard errors (between brackets)

	job entry (quick)	level of job (high)	wages per hour	monthly wages
GRAND MEAN	1.840	2.400	15.925	2.481
<u>year level</u>				
year				
- 1991	0.000	0.000	0.000	0.000
- 1992	-0.247 (.113)*	-0.100 (.104)	1.080 (.178)**	0.120 (.028)**
- 1993	-0.329 (.112)**	-0.176 (.102)	0.998 (.174)**	0.056 (.028)*
<u>department level</u>				
study				
- pedagogics	0.000	0.000	0.000	0.000
- technics	0.234 (.178)	-0.579 (.167)**	2.570 (.212)**	0.689 (.035)**
- economics	0.018 (.182)	-1.136 (.154)**	2.204 (.200)**	0.609 (.035)**
- health studies	1.253 (.205)**	-1.519 (.150)**	1.677 (.199)**	0.256 (.034)**
- social studies	-0.515 (.200)*	-1.437 (.187)**	2.846 (.281)**	0.126 (.046)**
- fine arts	-1.275 (.267)**	-1.217 (.315)**	5.542 (.506)**	-0.540 (.081)**

*: $p < .05$ **: $p < .01$

The analysis with respect to level of job shows the typical features of the labour market for teachers, where job entry is ruled by specific demands regarding the proper qualifications and where the graduates almost without exclusion become teacher. The hourly wages for graduates from 'teacher primary education' are the lowest of all 6 training courses and the same applies for the monthly wages, with one exception: the graduates from 'music teacher' have lower monthly wages because of a larger proportion of people holding parttime jobs.

Table 3
Results of the (logistic) 4-level analyses for 'gross' performance indicators
Residual variance components

	job entry	level of job	wages per hour	monthly wages
student level	n.a.	n.a.	16.067*	0.376*
year level	0.069*	0.000	0.180*	0.005*
department	0.103*	0.059*	0.000	0.000
college level	0.105*	0.000	0.000	0.002*

*: $p < .01$

Table 3 shows the residual variance components at the different levels.[5] For the analysis on job entry, we see that there are significant differences in the mean outcomes at all 3 levels. Of the total residual variance of 0.277 (=0.069 + 0.103 + 0.105) at higher levels, 25% can be attributed to differences within departments between the years, 37% to differences between the different departments within a college and the resulting 38% to differences between colleges. In other words, from the total amount of differences between departments and colleges over the years, 25% is due to change, or put alternatively: the stability of department and college effects for job entry amounts to 75%.

For the analysis on level of job, we only detect systematic differences between departments, with no variation over time and no differences between colleges.

For the analysis on hourly wages the picture is quite different. The total variance amounts to 16.247, only 1% of which can be attributed to differences between departments over the years. The stability of these department effects is zero: all differences found are due to variation in time. In the analysis on monthly wages only 1.8% can be attributed to differences between departments, most of which again is due to variation over time (stability: 28%).

Table 4 presents the results of the (logistic) 4-level analyses after controlling for student and regional factors. The results regarding the type of training followed and the year of survey, are very similar to the former results in table 2. Regarding the effects of personal characteristics, we note that males earn 0.4 guilders per hour more than females. Per month the difference amounts to 134 Dutch guilders in favour of males. The type of previous education followed, only has an effect on the job entry: graduates who have followed senior vocational secondary education before their course in higher vocational education, have a higher chance of being less than 3 months unemployed. Having job experiences before graduation increases the employment chances and also increases the monthly wages by 51 guilders. There is no significant effect of board experience. Age decreases the chances of being less than 3 months unemployed, but once a job is found it also increases the wages earned. Graduates who finish their study in a relatively short time, increase their chances of being less than 3 months unemployed and also increase their chances of acquiring a job which matches their educational level. Finally, regional differences in the labour market situation affect the labour market outcomes. Graduates who attended college in the western part of the Netherlands, have significantly higher chances of being less than 3 months unemployed than those who attended college in the south, the east and especially the north. Moreover, wages in the west are significantly higher than in the other parts of the Netherlands, amounting to 164 guilders difference

5. At the student level there is no variance component for the logistic analyses, because the dependent variable is a dummy.

with the mean monthly wages in the north. Those who found a job abroad earn the highest wages with a difference of 677 guilders compared to the monthly wages in the west.

Table 4
Results of the (logistic) 4-level analyses for 'nett' performance indicators.
Regressions coefficients and standard errors (between brackets); only significant (pl.05) coëfficients are shown

	job entry (quick)	level of job (high)	wages per hour	monthly wages
GRAND MEAN	5.330	3.386	8.025	1.741
Student level				
sex				
- female			0.000	0.000
- male			0.375 (.168)	0.134 (.026)
preliminary education				
- higher general	0.000			
- pre-university	-0.011 (.096)			
- senior vocational	0.219 (.116)			
- higher vocational	-0.170 (.352)			
- other educatation	0.108 (.259)			
job experience				
- no	0.000			0.000
- yes	0.208 (.088)			0.051 (.021)
board experience				
- no				
- yes				
region of work	n.a.			
- west			0.000	0.000
- north			-0.377 (.261)	-0.164 (.044)
- east			-0.354 (.165)	-0.117 (.028)
- south			-0.323 (.163)	-0.082 (.028)
- foreign			4.272 (.481)	0.677 (.074)
age	-0.103 (.021)		0.332 (.032)	0.031 (.005)
length of study	-0.148 (.065)	-0.241 (.067)		

Table 4 (continuation)
Results of the (logistic) 4-level analyses for 'nett' performance indicators.
Regressions coefficients and standard errors (within brackets), only significant ($p < .05$) coëfficients are shown

	job entry (quick)	level of job (high)	wages per hour	monthly wages
year level				
year				
- 1991	0.000	0.000	0.000	0.000
- 1992	-0.274 (.113)	-0.116 (.104)	1.099 (.170)	0.122 (.027)
- 1993	-0.328 (.111)	-0.184 (.102)	0.975 (.165)	0.055 (.027)
department level				
study				
- pedagogics	0.000	0.000	0.000	0.000
- technics	0.224 (.183)	-0.474 (.170)	1.873 (.242)	0.548 (.040)
- economics	0.000 (.178)	-1.097 (.155)	1.762 (.201)	0.521 (.036)
- health studies	1.262 (.209)	-1.515 (.150)	1.416 (.189)	0.210 (.034)
- social studies	-0.568 (.200)	-1.471 (.187)	2.332 (.276)	0.072 (.045)
- fine arts	-1.045 (.279)	-0.815 (.336)	3.594 (.507)	-0.823 (.082)
college level				
region		n.a.	n.a.	n.a.
- west	0.000			
- north	-0.937 (.204)			
- east	-0.534 (.153)			
- south	-0.562 (.153)			

Table 5 presents the residual variance components at the different levels, after taking account of the student and regional factors. We note that the residual variance at the college level for 'job entry' has dropped considerably. The total residual variance now amounts to 0.193, which means that 30% of the original residual variance at the three higher levels is explained by student factors or region. There is no residual variance left at the college level, indicating that differences between institutes of higher vocational education must be attributed to the effects of a department, rather than the effect of the college as a whole. To give an example, a college may have a relatively well performing technics department, and at the same time a relatively bad performing health department. The performance of the different departments within a college is unrelated to each other. A part of the department effects varies over the years. The stability of the department effects, after controlling for student and regional factors, can now be estimated to be 68% ($=0.132/(0.061+0.132)$).

Table 5
Results of the (logistic) 4-level analyses for 'nett' performance indicators
Residual variance components

	job entry	level of job	wages per hour	monthly wages
student level	n.a.	n.a.	15.253*	0.356*
year level	0.061*	0.000	0.129*	0.004*
department level	0.132*	0.058*	0.000	0.000* [1]
college level	0.000	0.000	0.000	0.002*

*: $p < .01$
[1] 0.0002 to be precise, and significant at $\alpha < .01$

For 'level of job' we note results very similar to the former model. There is no residual variance at year or college level. Introducing student and regional variables caused only a very small drop in the residual variance at the department level. Only 2% of the original residual variance at this level is 'explained' by these variables.

For 'hourly wages' and 'monthly wages' the model hardly improved by introducing the student and regional variables. In the case of 'hourly wages' the drop in residual variances at all levels is only 5%. The residual variances at department and college level remain zero: there are no systematic differences between departments or colleges in this respect. In the case of 'monthly wages', introduction of the student and regional variables 'explains' 6% of the original residual variance. There remain very small systematic differences in labour market outcomes between colleges and departments, but a large part of these effects is due to variation over time.

The residual effects at the department level may be regarded as the performance indicator of a department regarding the labour market outcomes. In this respect, it is interesting to compare the 'gross' performance with the 'nett' performance, that is the performance after taking account of the student and regional factors. Table 6 presents the correlations between the gross and nett performance indicators. One conclusion that may be drawn, is that the correlation between gross and nett indicators is high, but not perfect. In the case of 'job entry' the correlation between the two indicators is .77, indicating that only 59% of the differences in the nett outcomes of a department is correctly predicted by the gross outcomes. In the case of 'monthly wages' the predictive value of the gross outcomes is 67%, while in the case of 'level of job' the predictive value of gross outcomes is almost perfect. This can also be illustrated by the rankings presented in the appendix. In the case of 'job entry' in 10 out of 97 cases the ranking of gross and nett outcomes differs more than 40 places, turning a relatively well-performing department into a relatively bad one and vice versa. In the case of 'monthly wages' this happens only in 5 out of 97 cases, while in the case of 'level of job' it does not happen at all.

5 Summary and conclusions

The main results can be summarized as follows:

* There are systematic differences between departments and colleges in the following quality indicators with respect to the labour market outcomes of their graduates: chance of being less than 3 months unemployed; chance of acquiring a job which matches the educational level attained and gross monthly wages.

* These effects remain significant even after controlling for student and regional factors. They are due to differences between departments rather than differences between colleges.

* The department effects are rather stable in the case of chances of being less than 3 months unemployed and of acquiring a job which matches the educational level attained. In the case of monthly wages the effects vary considerably over time.

* The nett quality indicator of a department (i.e. the outcome after controlling for student and regional factors) differs considerably from the gross quality indicator, except in the case of level of job.

* Departments which effectively improve their graduates' chances of finding a job are not necessarily also effective in improving the quality of work, as indicated by level of job or wage.

What are the theoretical and empirical implications of the previous analysis?

First of all, it seems important to extend school effectiveness research to the area of labour market outcomes. Colleges do have an effect on the labour market success of their graduates. The leading theories within the school effectiveness research, however, seem to bear only little relevance with regard to these labour market outcomes. To build a coherent theoretical framework, theories of effective instruction and effective schools need to be integrated with theories about the role of education in selection processes on the labour market (c.f. Van der Velden et.al., 1989).

The analysis shows that schools which are effective in the area of improving their graduates' employment chances, are not necessarily effective in the area of improving the quality of the jobs which the graduates hold. This is in line with previous analyses of Van der Velden and Wieling (1994) and Van Smoorenburg and Van der Velden (1995), who showed that the labour market position of types of education can be distinguished in two major dimensions: employment chances and quality of work. These dimensions can be shown to be theoretically and empirically independent. The fact that these two

dimensions are also relevant in the analysis of differences between institutes, stresses the importance of this distinction. In the theoretical framework it is important to elaborate on the factors which makes an institute more effective in one area and which factors are of importance in the other area.

Bearing in mind the growing importance of external quality control both for higher education as well as for secondary education, implicates that there is an increasing need for valid and reliable information about the performance with respect to labour market outcomes of institutes of education. In this respect, the added value of an institute, i.e. the performance after controlling for input or regional factors, is of particular interest. Given the fact that the nett performance of an institute quite often differs considerably from the gross performance, institutes should only be judged on the basis of this nett performance. The model presented here offers an adequate way of calculating these 'nett' quality indicators.

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Appendix

Rankings of studies and colleges on 8 performance indicators[1]

study	cono	jeg	jen	jlg	jln	whg	whn	mwg	mwn
2	58	22	18	30	28	51	51	2	3
2	28	26	80	26	26	51	51	9	40
2	43	10	8	22	22	51	51	12	25
2	79	24	19	18	18	51	51	21	20
2	70	80	67	67	69	51	51	27	5
2	80	74	28	39	38	51	51	28	9
2	17	45	65	35	36	51	51	34	48
2	83	46	40	9	9	51	51	39	19
2	76	96	90	51	53	51	51	41	24
2	64	1	2	15	15	51	51	44	41
2	27	48	68	14	14	51	51	46	52
2	42	4	3	56	56	51	51	47	59
2	14	35	29	44	46	51	51	49	62
2	1	98	91	73	73	51	51	61	27
2	50	15	33	34	35	51	51	65	67
2	11	2	4	70	68	51	51	69	80
2	24	63	82	23	23	51	51	72	82
2	4	42	58	46	49	51	51	76	35
2	85	100	100	95	95	51	51	81	94
2	86	71	78	91	91	51	51	84	78
2	41	8	10	88	88	51	51	85	77
2	33	94	92	20	20	51	51	89	95
2	22	81	93	94	94	51	51	90	97
2	60	84	76	81	82	51	51	96	91
2	53	99	99	54	54	51	51	99	99
3	51	40	89	27	29	51	51	3	7
3	38	9	48	21	21	51	51	8	42
3	28	19	63	53	58	51	51	11	53
3	30	63	87	7	5	51	51	15	34
3	79	56	84	61	61	51	51	22	21
3	80	75	34	69	65	51	51	30	10
3	71	7	1	8	8	51	51	35	16
3	14	70	86	76	74	51	51	53	73
3	44	51	79	24	24	51	51	56	66
3	1	86	62	96	98	51	51	63	26
3	64	61	45	90	90	51	51	64	43
3	11	16	36	38	33	51	51	67	76
3	24	39	39	13	10	51	51	70	79
3	4	29	13	41	45	51	51	76	30
3	69	57	77	59	62	51	51	79	72
3	41	20	51	92	93	51	51	86	84
3	32	23	5	47	41	51	51	92	63
3	60	73	54	68	71	51	51	96	92

Rankings of studies and colleges on 8 performance indicators (continuation)[1]

study	cono	jeg	jen	jlg	jln	whg	whn	mwg	mwn
4	51	12	30	65	67	51	51	4	12
4	28	11	21	31	30	51	51	10	44
4	7	67	25	2	2	51	51	13	6
4	30	25	37	99	100	51	51	19	45
4	80	97	96	49	52	51	51	31	13
4	17	44	60	58	55	51	51	34	51
4	13	62	75	43	43	51	51	36	38
4	73	87	69	19	19	51	51	40	15
4	63	60	31	72	72	51	51	42	31
4	37	3	12	45	44	51	51	43	74
4	64	77	94	98	96	51	51	46	65
4	67	5	9	10	12	51	51	51	46
4	44	52	72	80	80	51	51	56	68
4	1	88	44	6	7	51	51	59	23
4	24	43	66	74	77	51	51	71	81
4	40	47	22	36	31	51	51	87	60
4	32	79	73	84	87	51	51	92	61
5	18	68	52	4	4	51	51	1	1
5	57	34	35	69	85	51	51	5	18
5	30	21	16	100	97	51	51	17	36
5	23	54	47	87	84	51	51	24	55
5	70	76	46	55	51	51	51	26	4
5	80	85	64	28	34	51	51	28	11
5	17	32	27	97	99	51	51	32	47
5	68	93	97	3	3	51	51	37	54
5	14	72	88	85	89	51	51	53	75
5	1	90	59	1	1	51	51	61	26
5	24	66	81	86	86	51	51	74	90
5	4	41	56	64	63	51	51	78	32
5	85	33	7	93	92	51	51	82	96
5	60	69	43	42	42	51	51	94	88
5	53	65	11	29	27	51	51	100	100
6	38	13	55	76	75	51	51	7	39
6	30	37	49	48	47	51	51	17	37
6	20	55	42	11	13	51	51	20	8
6	23	78	95	5	6	51	51	23	49
6	70	89	70	60	59	51	51	25	2
6	66	92	98	77	81	51	51	38	57
6	14	49	61	32	32	51	51	52	71
6	44	27	15	63	64	51	51	56	70
6	3	38	23	57	57	51	51	58	58
6	11	6	14	37	39	51	51	69	86
6	24	30	20	79	78	51	51	73	89
6	4	31	6	62	60	51	51	76	29
6	85	64	57	82	79	51	51	81	93
6	32	58	41	25	25	51	51	92	69
6	60	59	32	71	66	51	51	94	87
6	53	95	85	12	11	51	51	98	98

Rankings of studies and colleges on 8 performance indicators (continuation)[1]

study	cono	jeg	jen	jlg	jln	whg	whn	mwg	mwn
7	12	14	24	40	40	51	51	6	14
7	30	28	38	66	70	51	51	15	33
7	54	18	53	33	37	51	51	45	56
7	1	91	71	75	76	51	51	59	22
7	72	82	74	52	48	51	51	66	64
7	6	36	26	16	16	51	51	88	85

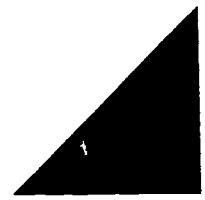
[1]: the table is ordered according to the ranking on gross monthly wages

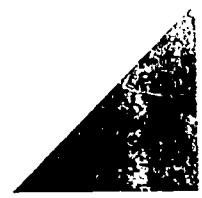
Explication:

study: 2 = pedagogics (teacher primary education)
3 = technics (mechanical engineering)
4 = health studies (nurse training)
5 = economics (business administration)
6 = social studies (social work)
7 = fine arts (musician)

cono: collegenumber

jeg: ranks based on gross job entry
jen: ranks based on nett job entry
jlg: ranks based on gross level of job
jln: ranks based on nett level of job
whg: ranks based on gross wages per hour
whn: ranks based on nett wages per hour
mwg: ranks based on gross montly wages
mwn: ranks based on nett montly wages





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