Assessing Institutional Effects of Colleges. The Labour Market of their Graduates, L.F.M. Nieuwenhuis & W.J. Nijhof, The Dynamic of VET and HRD Systems

CHAPTER 12

Assessing institutional effects of colleges - the labour market success of their graduates -

ROEL J. BOSKER, ROLF VAN DER VELDEN AND PEET VAN DE LOO

12.1. 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 in interest in the public reporting and accountability of education is due to the following factors:

* a growing awareness that improvement in the quality of education is necessary to increase Europe's competitiveness on a global market and to face the challenges of the future (cf. European Commission, 1993; IRDAC, 1990);
* constraints on educational budgets due to higher enrolments, 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, interest in educational indicators can be demonstrated in projects like the Indicators of Education Systems (INES) project of the Organisation for Economic Cooperation and Development or the Educational Indicators Project (CEIP) of the European Commission (West et al., 1995). Interest in the quality of education is also demonstrated in the Maastricht Treaty on European Union: 'the European Community 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 educational performance at a national level as well as a regional and institutional level (Bosker & Scheerens, 1995; Croxford & Cowie, 1996; Ministry of Education, Culture and Science, 1995; Willms & Kerckhoff, 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. This paper marked a change in the administrative relation towards higher education. Instead of direct control of the contents and quality of higher education, the Ministry placed greater emphasis on autonomy and self-regulation for 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.
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, as well as 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 this 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 chapter 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 checking for student and regional characteristics?
2. Are the differences between these colleges stable over time?

If the answers to these questions are positive, then this underpins the arguments of those who claim that schools, training programmes, universities and colleges should be evaluated by their long-term external effects rather than by their short-term internal effects (achievement levels in certain subject domains) (cf. Dijkstra et al., 2001).

12.2 Theoretical background

The study presented in this chapter 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 checking 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 (Brandsma & Knuver, 1989; Mortimore et al., 1988). The effects seem to be greater 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 & Scheerens, 1994; Scheerens, 1993; Scheerens & Bosker, 1997), no mention is made of research into 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 to our study 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 constraint (including governmental constraint) 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). On the one hand, the institutions of higher education obtained greater autonomy with respect to the 'input' and 'process' factors. On the other, the institutions are being called more and more to account for their 'output'. Effectiveness and efficiency became central concepts: higher education became responsible for 'managing' its institutions itself. In this framework, it is relevant to mention that De Jager (1994) shows that the relationship between the organisational 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 pedagogic 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 the ideas and tools of the American 'accreditation system'. In the Netherlands, this led to a nation-wide, public quality assurance system of 'visiting committees'. All institutions providing a discipline are 'visited' periodically. This is a rolling review process with two complementary phases: internal evaluation by the faculty, reported in a self-study report, and visitations by external commentators. A checklist, consisting of a set of performance indicators, and the operationalisation 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 is more and more considered as an important indicator to judge the quality of a higher general or vocational educational discipline.

The third line of research of relevance here is 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 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. This is especially the case in branches in which the 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 "over-education" is given by Robst (1995). In a paper examining the relation between college quality and "over-education", he shows that workers who attended a lower quality college have a greater likelihood of ending up in a job for which they are "over-educated". In the Netherlands, Van der Velden et al. (1989) have shown that the following factors are relevant to labour market outcomes: high selectivity during training, an appropriate match between educat on and occupation, effective instruction, and an active labour market policy.
In this chapter, we restrict the analysis to the question of whether there are any differe between colleges of higher vocational education after checking for student and reg

factors, and leave aside the question of which factors these differences may be attributed to. 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 greater for employment opportunities than for outcomes, which are more institutionally defined (e.g. wages).

12.3 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 would 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 since 1991. About two-thirds of all colleges make use of this instrument, which makes it the most important instrument for external quality control.

The instrument consists of an annual survey of graduates of the participating colleges. In this survey, information is collected about destination, labour market entry, spells of unemployment, and the jobs that the graduates hold. The survey is held eighteen months 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, in which the results of the total outflow of a particular sector of higher vocational education are analysed (see Van de Loo & 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 & Van der Velden, 1994). This means that the target population consists of graduates from higher vocational education from the following cohorts: 1989/90, 1990/91 and 1991/92. We restrict the data set to graduates from the largest types of training within the following six 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/trade economics, nurse training, social work training and music teacher training.

In the analysis, we used the following dependent variables: a dummy indicating if the graduate had been unemployed for less than 3 months during the job entry period ("job entry"), a dummy indicating if the level of the job corresponded to the level of higher education ("level of job")[1] and two indicators for income ("gross hourly wages" and "gross monthly wages")[2].

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[1] Zero corresponding to a job level lower than higher education ("over-education").
[2] The difference between these two variables is, of course, that monthly wages are dependent on whether it concerns a part-time or a full-time job, whereas hourly wages are not.

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[3] and length of study. To check for regional and annual business cycle variations on the labour market we include the region where the college is situated, the region where the graduate is employed, and the year of survey.

Table 12.1 presents some descriptive statistics. Some 15% of the graduates were unemployed for more than three months during the period between graduation and the survey. At the time of the survey, 79% held a job which matched their educational level. Their gross monthly wages amounted to NLG. 2,880, while gross hourly wages were slightly more than NLG.18 on average.

A majority (60%) of the sample used for this analysis is female[4]. 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[5].

Table 12.1: Means (standard deviations) and proportions

	job entry	income & level of job
Dependent variables		
job entry		n.a.
- quick (≤ 3 months)	85.3%	
- slow	14.7%	
level of job	n.a.	
- lower than higher vocational		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)*

[3] Board experience includes having been a board member of a corporation, but also having been an officer of a club, society, or association.

[4] This is due to the fact that male graduates of HBO continue their educational career more often than do female HBO graduates (Van de Loo et al., 1992-1994). In this analysis, contemporary students are excluded. The analysis only involves the labour force. In general, women comprise only half of the population of HBO graduates.

[5] 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), which is the normal route for further education for students graduating from intermediate general secondary education (MAVO: duration 4 years) or from junior vocational education (LBO: duration 4 years), prepares mainly for the labour market although it has an increasing share of graduates following further education.

Table 12.1 (continuation): Means (standard deviations) and proportions

	job entry	income & level of job
Predictor Variables		
Student level	N_s= 6275	N_s= 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%
year level	N_y=223	N_y=223
year		
- 1991	28.7%	28.7%
- 1992	34.1%	34.1%
- 1993	37.2%	37.2%

Table 12.1 (continuation). Means (standard deviations) and proportions

	job entry	income & level of job
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 from 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 employment. For the northern and eastern regions, there is a negative nett migration flow of graduates to this dominant western part of the Netherlands.

A nested design is used, consisting of the following levels: student, year, department (sector of college) and college level. As we selected only one course per sector, the department level coincides with the training course. We restricted the data set to those graduates who, at the time of the survey, were part of the labour force (employed plus unemployed). This amounts to a total of 6,275 cases[6]. 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.

Multilevel (logistic) models (cf. Bryk & Raudenbush, 1992; Goldstein, 1995; Snijders & Bosker, 1999; Wong & Mason, 1985) are used to estimate regression parameters, variance components and residuals. The residuals indicate to which degree students from a given college on average attain or earn beyond what is expected on the basis of all the predictor variables in the model. The residuals thus are the performance indicators for the colleges.

[6] 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 time of the survey. This amounts to 4,303 cases.

The variance components can be used to assess the amount of variation uniquely due to colleges, departments and years. The ratio of the department plus college variance over the department, plus college, plus year variance is the estimate of the across-year stability of the performance indicators.

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

12.4 The results

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. In the appendix, we have included tables that include the estimated regression parameters. Table A1 in the appendix contains the results of the initial models to produce gross performance indicators. In order to answer our questions, only the estimated variance components are of interest.

Table 12.2 shows the residual variance components at the different levels[7]. For the analysis of 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, of the total amount of differences between departments and colleges over the years, 25% is due to change, or to put it another way, the stability of department and college effects for job entry amounts to 75%. One interpretation of the combined variation between college and department level is that the 10% best performing departments have 14% more students enrolled quickly into their first job than the 10% worst performing departments.

Table 12.2: 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*

*: $p < .01$

For the analysis of level of job, we detected only systematic differences between departments, with no variation over time and no differences between colleges. The 10% best performing departments have 5% more students at the right job level than the 10% worst performing departments.

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

For the analysis of 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 of monthly wages, only 1.8% can be attributed to differences between departments, most of which again are due to variation over time (stability: 28%). Furthermore, the differences between the colleges in monthly wages show that students from the 10% best performing colleges earn NLG. 80 more per month than do those from the 10% worst performing colleges.

In table A2 in the appendix, the results of the (logistic) 4-level analyses are presented, after checking for student and regional factors. Once again, we concentrate on the estimated variance components (see Table 12.3).

Table 12.3: Results of the (logistic) 4-level analyses for 'net' 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 $\alpha < .01$

Table 12.3 presents the residual variance components at the different levels, after taking account of student and regional factors. We note that the residual variance at 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 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 technics department that performs relatively well, and at the same time, a health department that performs relatively poorly. The performances of the different departments within a college are unrelated to each other. A part of the department effects varies over the years. The stability of the department effects, after checking for student and regional factors, can now be estimated to be 68% (=0.132/(0.061+0.132)).

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 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', the introduction of 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 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 student and regional factors. Table 12.4 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 are 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.

Table 12.4: Correlations between department level performance indicators

job entry gross	1.000							
job entry nett	0.771**	1.000						
Level of job gross	0.009	0.102	1.000					
Level of job nett	0.014	0.114	0.998**	1.000				
wages per hour gross	-	-	-	-	-			
wages per hour nett	-	-	-	-	-	-		
monthly wages gross	0.264*	0.045	0.117	0.118	-	-	1.000	
monthly wages nett	0.027	0.093	0.253*	0.256*	-	-	0.820**	1.000
	Job Entry Gross	job entry nett	level of job gross	level of job nett	wages per hour gross	wages per hour nett	monthly wages gross	monthly wages nett

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

It is interesting to note the low correlations between the outcomes of the three different types of indicators: job entry, level of job and monthly wages[8]. The correlation between the first and the second is .11, between the first and the third .09, and between the second and third .26. In other words, having a good score on one performance indicator has no predictive value for the score on another. To put it another way, what makes a department effective in one area does not necessarily make it effective in another.

12.5 Summary and conclusions

The main results can be summarised as follows:

- There are systematic differences between departments and colleges in the following performance indicators with respect to the labour market outcomes of their graduates: chance of being unemployed for less than 3 months; chance of acquiring a job which matches the educational level attained, and gross monthly wages.
- These effects remain significant even after checking for student and regional factors. They are due to differences between departments, rather than differences between colleges.
- The differences between departments and colleges are, however, only marginal. 14% quicker job enrolment, 5% more adequate jobs, and earnings of NLG. 80 per month are the difference between the best and the worst performing departments/colleges.
- The department effects are rather stable in the case of the chance of being unemployed for less than 3 months 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 performance indicator of a department (i.e. the outcome after checking for student and regional factors) differs considerably from the gross performance 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, colleges do have an effect on the labour market success of their graduates. The leading theories within educational effectiveness research, however, seem to bear only little relevance 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 (cf. Van der Velden et.al., 1989).

The analysis shows that colleges 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 the 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 classified in two major dimensions: employment opportunities 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

[8] As there is no residual variance at department level for hourly wages, no correlations are presented.

the factors which makes an institute more effective in one area and which factors are of importance in the other.

Furthermore, we might conclude that there is some evidence that it may be worthwhile to evaluate schools, training programmes, and colleges on their external returns in addition to their internal outputs. It remains to be studied, however, if the short-term institutional outcomes are related to the long-term ones.

The growing importance of external quality control both for higher education and for secondary education implies that there is an increasing need for valid and reliable information about performance with respect to the labour market outcomes of institutes of education. In this respect, the added value of an institute, i.e. 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 its gross performance, institutes should only be judged on the basis of this nett performance. The model presented here offers an effective way of calculating these 'nett' performance indicators.

References

Becker, G.S. (1975). *Human capital: A theoretical and empirical analysis with special reference to education*, 2nd edition. New York: NBER.

Bosker, R.J. (1990). *Extra kansen dankzij de school?* Nijmegen: ITS, OOMO reeks.

Bosker, R.J., & Scheerens, J. (1995). A selfevaluation procedure for schools using multilevel modelling. *Tijdschrift voor Onderwijsresearch, 20*, 154-165.

Brandsma, H.P., & Knuver, J.W.M. (1989). Organizational differences between Dutch primary schools and their effect on pupil achievement. In D. Reynolds, B.P.M. Creemers & T. Peters (Eds.), *School effectiveness and improvement.* Proceedings of the First International Congress, London (pp. 199-212). Groningen/Cardiff: RION, University of Wales.

Bryk, A.S., & Raudenbush, S.W. (1992). *Hierarchical linear models*, Newbury Park: Sage.

Creemers, B.P.M. (1992). School effectiveness and effective instruction: the need for a further relationship. In J. Bashi & Z. Sass (Eds.), *School effectiveness and improvement.* Proceedings of the Third International Congress, Jerusalem (pp. 105-132). Jerusalem: The Magnes Press.

Creemers, B.P.M. (1994). Effective instruction as a basis for effective education in schools, *Tijdschrift voor Onderwijsresearch, 19*, 3-16.

Creemers, B.P.M., & Scheerens, J. (1994). Developments in the educational effectiveness Research programme. *International Journal of Educational Research, 21*, 123-140.

Croxford, L., & Cowie, M. (1996). *The effectiveness of Grampian secondary schools* (a report to Grampian Education Authority).

Dijkstra, A.B., Karsten, S., Veenstra, R., & Visscher, A. (2001). *Het oog der natie: scholen op rapport. Standaarden voor de publicatie van schoolprestaties.* Assen: Van Gorcum.

European Commission (1993), *White paper.*

Glebbeek, A.C. (1989). De arbeidsmarktpositie van opleidingen. *Tijdschrift voor Arbeidsvraagstukken, 4*, 75-89.

Goldstein, H. (1995). *Multilevel statistical models*. London: Edward Arnold.

IRDAC (1990). *Skills shortages in Europe.*

Jager, G. de (1994). *Invloedrijke beelden, Over de betekenis van paradigma's en hun invloed op de besturing van hogescholen.* Rotterdam: Erasmus Universiteit.

Loo, P.J.E. van de, Ramaekers, G.W.M., & Velden, R.K.W. van der (1992). *De arbeidsmarktpositie van afgestudeerden van het hoger beroepsonderwijs, HBO-Monitor 1991.* Den Haag: HBO-Raad.

Loo, P.J.E. van de, Velden, R.K.W. van der, & Wieling, M.H. (1993). *De arbeidsmarktpositie van afgestudeerden van het hoger beroepsonderwijs, HBO-Monitor 1992.* Den Haag: HBO-Raad.

Loo, P.J.E. van de, & Velden, R.K.W. van der (1994). *De arbeidsmarktpositie van afgestudeerden van het hoger beroepsonderwijs, HBO-Monitor 1993.* Den Haag: HBO-Raad.

Ministerie van Onderwijs en Wetenschappen (1985). *Hoger Onderwijs: autonomie en kwaliteit (HOAK-nota).* Zoetermeer: Ministerie van Onderwijs en Wetenschappen.

Ministerie van O.C. en W. (1995). *De school als lerende organisatie.* Den Haag: SDU.

Mortimore, P., Sammons, P., Stoll, L. Lewis, D., & Ecob, R. (1988). *School matters: The junior years.* Wells: Open Books.

Robst, J. (1995). College quality and overeducation. *Economics of Education Review, 14,* 221-228.

Scheerens, J. (1990). School effectiveness research and the development of process indicators of school functioning. *School Effectiveness and School Improvement, 1,* 61-80.

Scheerens, J. (1993). Basic school effectiveness research: Items for a research agenda. *School Effectiveness and School Improvement, 4,* 17-36.

Scheerens, J., & Bosker, R.J. (1997). *The foundations of educational effectiveness.* Oxford: Pergamon.

Schultz, T.W. (1961). Investment in Human Capital. *American Economic Review, 51,* 1-17.

Segers, M.S.R. (1993). *Kwaliteitsbewaking in het hoger onderwijs, een exploratieve studie naar prestatie-indicatoren in theorie en praktijk.* Utrecht: Uitgeverij Lemma BV.

Smoorenburg, M.S.M., & Velden, R.K.W. van der (1995). The labour market positions of types of education. *Dimensions and stability.* Maastricht: ROA.

Snijders, T.A.B., & Bosker, R.J. (1999). *Multilevel analysis. An introduction to basic and advanced multilevel modeling.* London: Thousand Oaks / New Delhi: Sage.

Velden, R.K.W. van der, Edelenbos, P., & Mensen, Th. (1989). *Letteren en arbeidsmarkt.* Zoetermeer: Ministerie van Onderwijs en Wetenschappen.

Velden, R.K.W. van der, & Wieling, M.H. (1994). De arbeidsmarktkansen per opleiding. In: H. Scholten en S.C. de Groot (red.). *Arbeidsmarkt en sociale zekerheid, beleid in beweging,* 106-114. Tilburg: IVA.

West, A., Pennel, H., Thomas, S., & Sammons, P. (1995). *The origins and development of the European Community - educational indicators project.* Paper for presentation at the European Conference on Educational Research.

Willms, J.D., & Kerkhoff, A.C. (1995). The challenge of developing new educational indicators. *Educational evaluation and policy analysis, 17,* 113-13.

Wong, G.Y., & Mason, W.M. (1985). The hierarchical logistic regression model for multilevel analysis. *Journal of the American Statistical Association,* 80, 513-524.

Appendix

Table A1: 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
year level				
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)*
department level				
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)**

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

Table A2 : Results of the (logistic) 4-level analyses for 'nett' performance indicators. Regressions coefficients and standard errors (between brackets); only significant ($p < .05$) coefficients 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)
age	-0.103 (.021)		0.332 (.032)	0.031 (.005)
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)			
length of study	-0.148 (.065)	-0.241 (.067)		
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)

Table A2 (continuation): Results of the (logistic) 4-level analyses for 'net' performance indicators. Regressions coefficients and standard errors (between 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)			