Discipline-specific and academic competencies of the higher educated: their value in the labour market and their acquisition in education

ROA-W-2006/9E

Hans Heijke, Christoph Meng

Paper presented on the occasion of the departure of Wim J. Nijhof,
University of Twente, 29 September 2006

Research Centre for Education and the Labour Market

Faculty of Economics and Business Administration
Maastricht University

Maastricht, December 2006

ISBN 978-90-5321-451-0
Sec07.001.doc

Abstract

This paper summarizes the outlines of three empirical studies that we have carried out on actual labour market value of the various types of competencies acquired in higher education and how these competencies may be taught most effectively. The focus is on the discipline-specific competencies and academic competencies. In all three studies, use was made of the European CHEERS dataset. The main results with regard to the labour market value of the various competencies are that a high level of discipline-specific competencies provides graduates with a comparative advantage in jobs within their own professional domain, where they also earn more than outside this domain. Graduates who possess a high level of academic competencies, have a comparative advantage outside their own professional domain, where they may initially earn less than in their own domain. As they are more inclined to take part in training activities and are able to obtain the required competencies for a supervisory position more quickly, their salaries rise more quickly with time. With regard to the organization of the education process, we found that activating learning methods contribute effectively to both the acquisition of academic competencies and the acquisition of discipline-specific competencies. By combining these methods with a more prominent position for knowledge transfer by teachers, the acquired level of discipline-specific competencies can be increased without affecting the acquisition of academic competencies.

Keywords: discipline-specific competencies, academic competencies, higher education, value of competencies, acquisition of competencies, activating learning methods, student time allocation.

JEL Codes: I21, I23, J24, J31.

1 Introduction

At the beginning of this century, the European Union set itself the ambitious task of becoming the most competitive and dynamic knowledge-based economy in the world in ten years' time.[1] In addition to research and innovation, investing in people by means of education and training is regarded as one of the cornerstones of the policy to achieve these goals. Higher education is involved in this process in two ways: as a producer of high-quality basic and applied knowledge, and as a supplier of high-quality education in which such knowledge is transferred to students.

The importance of higher education for economic development and technological innovation is often based uniquely on its research task. Of course the R&D processes, to which research in higher education contributes, are of great value to economic development. It should be remembered, however, that these activities are carried out by researchers who were educated in higher education, and their performance is determined in part by the contents and quality of their education. It is also important to realise that studies in higher education prepare students not only for a career in research, but to a large extent for other tasks elsewhere. Graduates end up in jobs and professions in which the knowledge acquired during their studies is required in order to perform properly. Their high-level performance as medical professionals, teachers, lawyers or sociologists, keeping up to date with developments in their fields of specialisation, and sharing their knowledge with others, serve a socioeconomic interest. In addition to promoting research, increasing participation in higher education across a wide range of studies and improving the quality of these studies, are of crucial importance to be able to achieve the ambitious goal of becoming the leading knowledge-based economy in the world.

Completing a study in higher education is more than acquiring the available knowledge in a particular field and the methods to apply this knowledge properly in the practical context of a job or profession. By taking part in higher education, students also acquire and develop the academic competencies necessary to also be able to work at a high level in jobs outside their own field of specialisation. A high level of competencies, such as the ability to learn, reflective thinking, problem-solving abilities and analytical competencies, enables graduates to adapt to new circumstances with relative ease and to acquire any missing knowledge that may be required. Academic competencies provide the higher educated with wider prospects in the labour market and allow them to be deployed flexibly as may be required by technological and organisational innovations in their working environment.

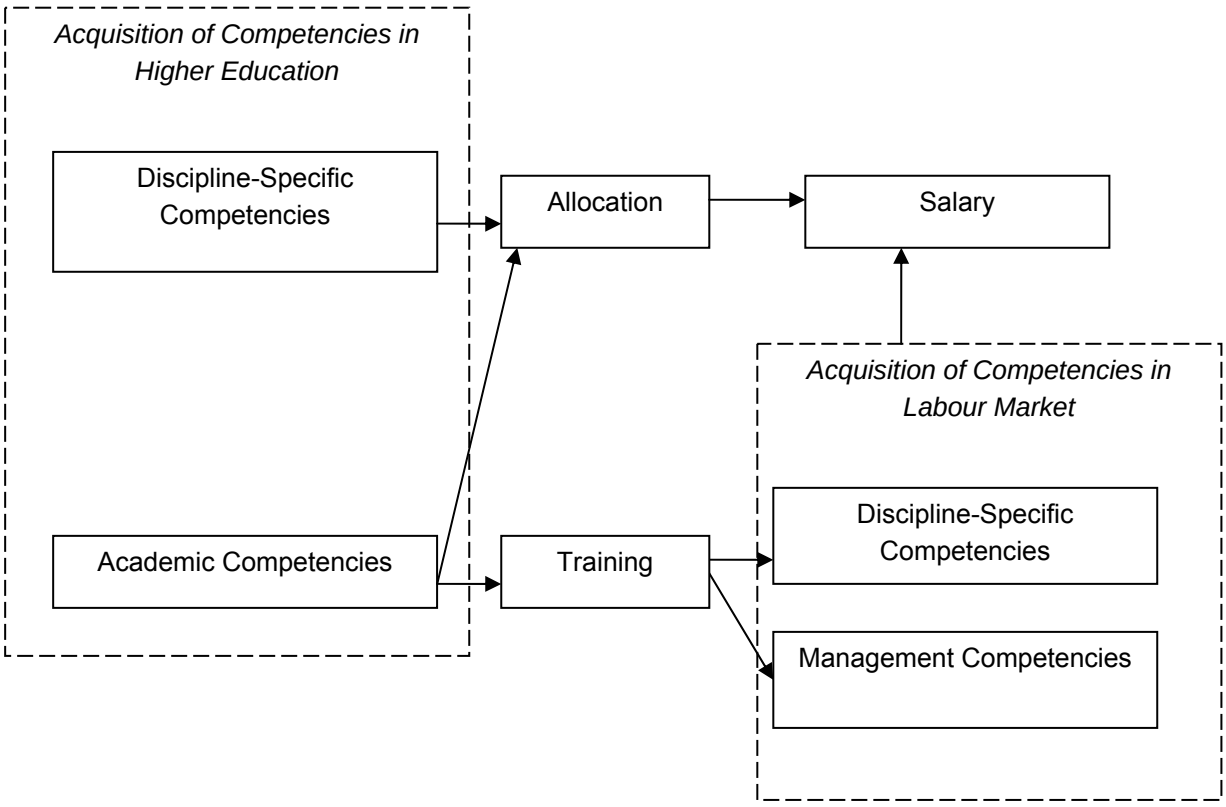
The demands that the emerging knowledge-based economy sets to higher education is frequently interpreted as a call for graduates who are socially adept, flexibly deployable, enterprising and internationally oriented. This demand appears rather paradoxical, considering the expectation that the knowledge-based economy would benefit most from a high level of knowledge. Perhaps it is assumed that this knowledge has already been provided to a sufficient degree in higher education and what today's graduates lack primarily

1. Lisbon European Council 23 and 24 March 2000, Presidency Conclusions.

is an adequate level of the above-mentioned generic competencies. At any rate, it seems plausible that the ambitious goals for the knowledge-based economy will come within reach more easily if the higher education studies are able to push the production frontier of the acquired competencies by their students outward, scoring with regard to generating discipline-specific knowledge as well as generic competencies. This shift of frontiers will necessarily demand a great deal from higher education in the EU member states.

In this paper, we would like to investigate, on the basis of three empirical studies that we have carried out, what the actual value is of the various types of competencies in the labour market and how these competencies may be taught most effectively in higher education. We will focus on the two core competencies in higher education: discipline-specific competencies and academic competencies. The three studies can be positioned in the diagram shown in Figure 1. From left to right, this diagram indicates the effects of the competencies acquired in higher education on the allocation and wages in the labour market. The diagram also shows the specific effect of academic competencies on further competency development after entry into the labour market and the related wage effect. Two of the three studies carried out focussed on this labour market issue. These will be discussed together in this paper. The third study concerns the acquisition of competencies in higher education. This educational study will be discussed separately, independent from the two labour market studies.

Figure 1
Schematic setup of paper



All three studies were carried out on the basis of the European CHEERS dataset. This dataset concerns a survey held in 1998 among graduates from higher education from three to four years prior to the survey. In addition to their personal details and educational backgrounds, and the competencies acquired in education, respondents were asked about their positions in the labour market. The part of the dataset that was used included 19,000 respondents from the following nine countries: Austria, Finland, France, Germany, Italy, the Netherlands, Norway, Spain, and United Kingdom. It should be said that not all analyses were always carried out on the full dataset. In particular the labour market analyses were only made for a few countries separately.

The labour market survey shows that discipline-specific competencies and academic competencies each play a distinct role in the labour market. A high level of discipline-specific competencies provides graduates with a comparative advantage in jobs within their own professional domain, where they also earn more than outside this domain. Graduates who possess a high level of academic competencies, have a comparative advantage outside their own professional domain, where they may initially earn less than in their own domain. As graduates with a higher level of academic competencies are more inclined to take part in training activities and are able to obtain the required competencies for a supervisory position more quickly, their salaries rise more quickly with time.

The outcomes of the survey on the organisation of the education process show that activating learning methods contribute effectively to both the acquisition of academic competencies and the acquisition of discipline-specific competencies. By combining the activating learning methods with a more prominent position for knowledge transfer by teachers, the acquired level of discipline-specific competencies can be increased without affecting the acquisition of academic competencies. An outward shift of the production frontier of competencies provided in higher education therefore seems possible.

The structure of this paper is as follows: Section 2 provides a definition and statistical demarcation of the discipline-specific competencies and academic competencies of the higher educated. Section 3 reports on the survey into the roles of the two types of competencies in the labour market. These roles have been investigated for two European countries. Section 4 discusses the study of the way in which these competencies can be acquired in education. This study concerns a Europe-wide cross-sectional analysis. In Section 5, we will draw a number of conclusions from the studies discussed.

2 Discipline-specific competencies and academic competencies

By completing a higher education, students increase their human capital which can be used productively in the labour market. A particular investment in human capital (for example four years of higher education) may consist of any of a wide variety of sets of acquired competencies. This is understandable when it comes to the specific content of the professional knowledge acquired in a higher education study. A physician needs to learn completely different things from an engineer or a lawyer. However, the acquired generic

competencies, such as the developed academic competencies, may also vary widely between studies in higher education, because the academic orientation is not equally strong in all studies in higher education. In addition, there may be differences in professional and academic competencies within a similar type of education, for example if this education is provided through different didactic concepts in different locations.

The heterogeneity of acquired competencies hiding behind a particular investment in human capital, may have an effect on the position that graduates obtain in the labour market. This is particularly the case if the various types of competencies each play an entirely different role in the process. In this paper, we want to try and identify and describe these roles. To do so, we will concentrate on the two types of competencies that take a key position in higher education: professional expertise, hereafter to be referred to as discipline-specific competencies, and academic competencies, which largely refer to the analytical skills and learning abilities. We expect that the discipline-specific competencies provide graduates with a comparative advantage in the jobs within their own professional domain, while academic competencies are important for their adaptation to new conditions, in particular outside their own domain, and for their career development.

In the economic research on the relationship between the competencies acquired in education and the labour market position of graduates, little use is made of a direct measurement of competency levels. The common approach is to look at the successfully completed set of subjects, possibly with the grades obtained (e.g. Altonji, 1995; Bishop, 1995; Mane, 1999). A recent exception is Green (1998), who does use directly measured, self-assessed competencies. We will also use measurements of self-assessed competencies. These were derived from the aforementioned CHEERS survey among graduates who left three to four years prior to the survey. Graduates were asked to indicate on a five-point scale, ranging from 1 (“not at all”) to 5 (“to a very high extent”), the extent to which they possessed a particular competency at time of graduation. Thirty-six individual items were distinguished. Using a hierarchical clustering method, we retained two clusters of competencies representing best our idea of discipline-specific competencies and academic competencies. The two clusters consist of the following individual items:

Discipline-specific competencies
Field-specific theoretical knowledge
Field-specific knowledge of methods

Academic competencies
Learning abilities
Reflective thinking, assessing one’s own work
Problem-solving abilities
Analytical competencies
Documenting ideas and information

The internal consistency of the two clusters was tested on the basis of the Cronbach’s alphas. These appeared to be well above the 0.7 limit that is usually regarded as acceptable.

For the analyses, we calculated the average competency score per cluster for each respondent. The aggregated results for each of the nine countries are presented in Table 1.

Table 1
Acquired level of competencies in Higher Education in nine European countries

Country	HE type	Acquired competencies	
		Discipline-specific	Academic
Italy	Universities	3.34	3.60
Spain	Universities	3.42	3.61
France	Grande Écoles	3.39	3.77
	Universities	3.38	3.60
Austria	Universities	3.80	3.71
Germany	Fachhochschulen	3.58	3.44
	Universities	3.75	3.64
Netherlands	HBO instellingen	3.63	3.54
	Universities	3.71	3.69
United Kingdom	New Universities	3.60	3.88
	Old Universities	3.47	3.83
Finland	Universities	3.62	3.66
Norway	University Colleges	3.74	3.69
	Universities	4.09	3.93

Source: Meng (2006)

In some countries, higher education distinguishes two types. For example, in addition to universities, France has its Grande Écoles, Germany its Fachhochschulen, the Netherlands its HBO instellingen, the United Kingdom its New Universities (the former Polytechnics), and Norway its University Colleges. In five of the nine countries, the acquired academic competencies are at a higher level than the discipline-specific competencies. This applies to the southern countries Italy, Spain and France, as well as the United Kingdom and Finland. In the other countries, the reverse is the case, and the discipline-specific competencies are at a higher level than the academic competencies. This applies to Austria, Germany, Netherlands and Norway.[2] The levels of assessments provided may be distorted by country, type of higher education and study programme. The analyses take this into account, in particular in the Europe-wide analyses of the education process, in which the competency scores have been standardised by country and study programme.

3 The role of discipline-specific and academic competencies in the labour market

Heijke, Meng and Ramaekers (2003) have studied the value of discipline-specific competencies and academic competencies for the position of graduates in the labour

2. A discipline-specific orientation versus an academic orientation may be related to the type of labour market in the respective countries, i.e. an occupational labour market versus an internal labour market (Meng, 2006).

market. They carried out their study on the basis of the CHEERS dataset for Northern Italy.[3] This dataset contained 534 eligible respondents. In addition to discipline-specific and academic competencies[4], management competencies were also distinguished. The study was done in stages.

In the first stage, it was investigated whether a direct pay-off could be found in the labour market for the three different types of competencies. This was done by estimating a Mincerian wage comparison, which explains the wage level on the basis of human capital factors, such as the education completed and experience gained. As all respondents had completed higher education, including the education level variable in the comparison was pointless. Included were dummies for study programme and the levels of the three competencies at the time of graduation. Other aspects that were taken into account included job characteristics such as having a supervisory job. No direct relationship could be established between discipline-specific and academic competencies on the one hand and wages on the other. Having management competencies, however, did have a significant positive effect on wage levels. The effect of the - undoubtedly related - appointment in a supervisory job also turned out to be significantly positive. Lastly, wages appeared to be significantly higher within the respondent's own professional domain of the study programme completed.

In the second stage, it was investigated whether there might be an indirect effect on wages, by analysing the role of the three distinct types of competencies in the labour market. The analysis focused on the level of management competencies required in the job concerned and the odds of working in one's own domain. Both of these factors yield higher wages.[5] The multivariate estimates completed, provided the following results: The required level of management competencies in a job had a significant positive relationship with the level of management competencies at the time of graduation, the level of academic competencies at the time of graduation, and whether the job was a supervisory one. Having a job within the study programme's own domain did not initially appear to be determined by the level of acquired competencies at the time of graduation. It did appear to be important whether the initial job after graduation was a job within one's own domain. Further analysis of the odds of the initial job being within one's own domain, resulted in the observation that the level of discipline-specific competencies at the time of graduation had a positive effect on these odds.

---

3. The effects of the labour market appeared to differ so much between Northern and Southern Italy that the data had to be split regionally. The study was then restricted to Northern Italy, which is the part that resembles the other Western European countries most.
4. A wider demarcation was used for the academic competencies than indicated in Section 2. The items of broad general knowledge, cross-disciplinary thinking, power of concentration, critical thinking and written communication skills were also included.
5. Assuming that in a supervisory job the required management competencies would be higher than in a non-supervisory job, as also appeared from the estimates.

The value of discipline-specific and academic competencies is therefore in the effect of these competencies on the allocation process and hence indirectly on the wage level. The discipline-specific competencies at the time of graduation appear to increase the odds of having a job in the domain of the study programme, where jobs yield higher wages. Academic competencies increase the odds of having a job in which management competencies are required. As these jobs command higher wages, there is also a pay-off in the labour market for this type of competencies.

In a follow-up study by Heijke, Meng and Ris (2003), the CHEERS dataset for the Netherlands, containing 1778 eligible respondents, was used to find out again what role discipline-specific competencies and academic competencies play in the allocation and performance of graduates from higher education in the labour market. Participation in training and its effects on wages were also analysed. Management competencies played no explicit role in the analyses. Use was made of a more sophisticated estimation model, in which allocation decisions and training decisions were estimated simultaneously, and the estimate of the effects on wages took into account any hidden heterogeneity.[6]

In this study, the discipline-specific competencies that graduates possessed at the time of graduation appeared to have a significant positive effect on the odds of having a job within the study programme's own professional domain. The academic competencies appeared to increase significantly the odds of having a job outside the study programme's own domain. In addition, the odds of participation in training appeared to be significantly greater as graduates had a higher level of academic competencies at the time of graduation. Academic competencies apparently make participation in training easier and more effective.

The results of the estimate of the wage equation have been represented in Table 2. Again, we found that working in one's own domain has a wage benefit. This is another indicator for a positive pay-off of discipline-specific competencies through the greater odds of a job in one's own domain. A high level of academic competencies leads to a greater chance of a job outside one's own domain, and thus to lower wages, but also to a higher rate of participation in training, which is recovered by higher wages (cf. the significant positive effect of TP).

In summary, discipline-specific competencies appear to provide graduates with a comparative advantage in finding a job within their own domain, where wages are higher than outside that domain. Academic competencies increase the odds of having a job outside one's own domain, where wages are lower. However, the latter also increase the odds of participating in training and acquiring the competencies necessary to perform successfully in a supervisory job. Both have a positive effect on wages. The initial unfavourable pay-off of academic competencies compared to discipline-specific competencies can therefore be turned around by the increased chance of participation in training and the acquisition of management competencies. Academic competencies therefore widen the scope of

6. In the Northern Italy study, the estimates of the odds of having a job in one’s own domain also took into account any hidden heterogeneity, in the odds of the initial job being within one’s own domain.

graduates in the labour market by enabling them to adapt more easily to new circumstances outside their own professional domain and provide the prospect of wage increases by easier participation in training activities and acquisition of the competencies required to perform successfully in a better paid supervisory job.

Table 2
The wage equation

Independent variables	Coefficients
Working outside own educational domain (HMM)	–0.110***
Training participation (TP)	0.059***
TP x HMM	0.035
HMM x Vertical discipline-specific mismatch (VMM)	0.003
Working inside own educational domain x VMM	–0.014***
Tenure (in months)	0.002***
HMM x tenure	0.001
Educational level mismatch	
Same educational level required	Ref.
Higher educational level required	0.038**
Lower educational level required	–0.110***
Experience during studies	
Internship during study (1–6 months)	–0.001
Internship during study (>6 months)	0.008
Employment related to study (1–6 months)	0.019
Employment related to study (>6 months)	0.065***
Age	0.011***
Gender: man	0.016
HBO graduate	–0.102***
Permanent job	0.062***
Full-time job	–0.053***
Private employer	0.004
Firm size	0.48–06***
λ′ (misallocation)	0.022
λ″ (training)	0.047*
Intercept	1.904***
Number of observations	1778
Adjusted *R2*	0.285
F–statistics	14.37

Dependent variable: log hourly wages were measured on the basis of the reported monthly wage rate and the reported working hours as set in the contract (hourly wages are measured as gross wages). The estimation also included 9 dummies for degrees achieved, 6 dummies for job titles and 16 dummies for economic sectors. To estimate λ′ and λ″, the probit model presented in Table 2 of Heijke, Meng, Ris (2003) is used; standard errors have been adjusted using the Murphy and Topel (1985) correction (the selection model estimation was conducted under LIMDEP 7.0; see Greene, 2000).
* Significant at 10% level.
** Significant at 5% level.
*** Significant at 1% level.
Source: Heijke, Meng, Ris (2003)

4 The acquisition of discipline-specific and academic competencies in education

The increasing demand for generic competencies in the labour market, together with the growing criticism of traditional learning styles, has led to a widespread introduction of activating learning methods in higher education in the past few decades. In the traditional learning style, the teacher is the key figure who controls the learning process and transfers the required knowledge in easily digestible chunks to passive recipients. Activating learning methods, on the other hand, expect the learner (student) to be an active discoverer. Stimulating the active discoverer in students is said to promote the acquisition of generic competencies such as 'gathering information', 'interpersonal competencies', 'team working', and 'problem-solving abilities' (see e.g. de Corte, 1990; Everwijn, 1999; van Woerden, 1997). The question is now whether this new didactic approach affects the acquisition of discipline-specific competencies or whether there is an outward shift of the educational production frontier, in which students in higher education acquire more of both types of competencies. Various authors have pointed at the importance of formal education for the learning returns of graduates (see e.g. Romer, 1993; Durden, Ellis, 1995; Dolton et al., 2001). This raises doubts as to the effects of the introduction of activating learning methods, such as problem-based learning, in which the traditional lessons are often replaced by more self-learning time.

In the study by Meng and Heijke (2005), an attempt was made to gain more insight in the effect of the learning environment in higher education on the acquisition of discipline-specific competencies and academic competencies. In addition, it investigated the effect of this on the way in which students used their time. Again, use was made of the CHEERS dataset, but this time for nine countries (see the introduction). The number of observations of graduates that could be used, was 18,532.

To determine the learning environment, we relied on the respondents' self-report on the emphasis attached by the higher education institute on particular curriculum aspects. More precisely, we used information on the following two questions:
"If you look back to your course of study you graduated from in 1994 or 1995: to what extent were the following modes of teaching and learning emphasized by your institution of higher education and its teachers?
A) Teacher as the main source of information and understanding?
B) Project- and problem-based learning?"

Table 3
Four different learning environments

		Emphasis on problem-based learning	
		Weak	Strong
Emphasis on teacher as main source of information	Weak	Traditional (45%)	PBL without teacher (20%)
	Strong	School-class (25%)	PBL with teacher (10%)

Source: Meng, Heijke (2005)

For both questions, the respondents were asked to indicate their answer on a five-point scale ranging from 1 (“not at all”) to 5 (“to a very high extent”). On the basis of these answers, we distinguished four types of learning environments: Traditional style, School-class style, PBL without teacher and PBL with teacher. See Table 3 for the exact demarcation of these types of learning styles and the percentages of respondents who were taught according to each learning style. In the table, the terms ‘weak’ and ‘strong’ relate to the scores 1-3 and 4-5, respectively.

The information on student time allocation was based on the question: “During your study at the higher education institute, approximately how many hours a week did you during term time spend on the following activities?”. The activities distinguished were ‘attending formal education of the main subject’, ‘self-study on the main subject’, ‘following a second subject’, ‘extra-curricular activities (e.g. student association)’, and ‘employment’. Table 4 lists the average weekly time allocation. The findings show that on average students spend about 32 hours a week on their main study and about 2 days a week on paid work.

Table 4
Student time allocation

	Average weekly time (h and min)
Attending formal education of main subject	17h 35min
Self-study for main subject	14h 49min
Following a second subject	1h 35min
Extra-curricular activities	4h 47min
Employment	16h 20min

Source: Meng, Heijke (2005)

The effects of the type of learning environment and the allocation of time during a study on the level of discipline-specific competencies at the time of graduation and the level of academic competencies at the time of graduation, were estimated using a stochastic frontier model. The estimates took into account the existence of an interrelationship between the two types of competencies. After all, the academic competencies promote the acquisition of discipline-specific competencies. The estimates were made on the basis of standardised competency scores. These scores may exhibit a bias by study programme, the higher education institution or the country in which the respondent graduated. Ninety-eight different study programmes were distinguished, nested in 14 different higher education institutions that were nested in 9 different countries. In the estimate equations, a number of controls were included relating to personal characteristics and previous education, internships, time spent abroad and several additional curriculum aspects. With respect to the allocation of time, two interaction terms were included. The first term (‘required formal education’) concerns the interaction between the hours spent on formal education, and a dummy that is 1 if the higher education institute puts a great deal of emphasis on the attendance requirement of students. The second term (‘study-related work’) represents the interaction between the hours spent on paid work and a dummy that is 1 if the work was to a high or very high extent related to the field of study. A summary of the estimates made is represented in Table 5.

Table 5
The impact on competencies

	Discipline-specific competencies	Academic competencies
Constant	0.622***	-0.210**
Personal and pre-higher education characteristics		
Higher educated parents		0.023
Gender: man	-0.017	-0.070***
Age		0.008***
Academic pre-education		0.112***
Low secondary grades		Ref.
Medium secondary grades		0.088***
High secondary grades		0.245***
Learning environment		
PBL without teacher	Ref.	Ref.
Traditional	0.012	-0.208***
School class	0.047*	-0.206***
PBL with teacher	0.083***	0.027
Time allocation		
Formal education	0.002**	-0.002*
Required formal education	0.002**	0.001
Self-study	0.003***	0.004***
Study of second subject	0.000	0.005***
Extra-curricula	-0.001	0.001
Work	-0.001***	-0.001
Study-related work	0.003***	0.002***
Other time allocation		
Short internship	-0.006	-0.036
Long internship	-0.037	-0.030
Time spent abroad	-0.051***	0.063***
Additional curriculum aspects		
Facts and practical knowledge	0.144***	0.142***
Theories and concepts	0.146***	0.177***
Attitudes and interpersonal skills	0.019	0.128***
Independent learning	0.014	0.248***
Freedom to choose courses	-0.013	0.088***
Direct acquisition of work experience	0.039**	0.033
Out-of-class communication with other students	0.014	0.106***
Writing a thesis	0.071***	0.122***
Regular detailed assessment	0.064***	0.145***
Generic competencies	0.423***	
Σ	1.36	1.20
σ_u	1.20	0.89
σ_v	0.63	0.81
Λ	1.90***	1.09***
-Log L	25262	25677
N-cases	18532	18532

Note 1: All models further include dummies for the nine countries, dummies for the different higher education institutions inside a country, and dummies for seven educational programmes.
Note 2: *** significant at a 1% level, ** significant at a 5% level, * significant at a10% level.
Source: Meng, Heijke (2005).

With respect to the learning environment, we found - as expected - that activating learning methods provided the most effective learning conditions for the acquisition of academic competencies. Discipline-specific competencies, on the other hand, are acquired more effectively in a school-class learning environment, unless the activating learning environment is combined with a teacher who does not passively guide the discussion process or tutorial group meetings, but is actively involved in the transfer of knowledge to students. The combination of an activating learning environment with a teacher as the key source for the provision of knowledge may achieve an outward shift of the educational production frontier, so a win-win situation with regard to the acquisition of both discipline-specific and academic competencies.

With regard to the allocation of time by students, the results show that attending classes, in particular if the higher education institute places a strong emphasis on class attention, self-study, as well as work that is strongly related to the field of study, promote the effectiveness with which discipline-specific competencies are acquired. The last two variables also increase the effectiveness with which academic competencies are acquired, while formal education appears to have an unfavourable effect on this. For the acquisition of discipline-specific competencies, it matters a great deal if paid work is closely related to one's study or not. If the work is not closely related to the study, it has a negative effect on the acquisition of discipline-specific competencies, whereas if such a relationship does exist, the effect on discipline-specific competencies is favourable, as mentioned above. Lastly, the effectiveness of the acquisition of academic competencies is increased by studying a second subject. The latter study activity does not increase the level of discipline-specific competencies.

5 Conclusions

Higher education is expected to make a major contribution to the emerging knowledge-based economy, both in the field of research and in teaching. If we look at the various study programmes in higher education, it is not immediately clear which competencies they should concentrate on when it comes to teaching their students. Should the emphasis be on the acquisition of discipline-specific competencies by students, or should more attention be paid to the acquisition of generic, and in particular academic, competencies?

We have tried to contribute to finding an answer to this pressing question, by using the empirical research that we have carried out to provide insight in the value of both types of competencies in the labour market. It appeared that discipline-specific competencies provided graduates with a comparative advantage in their performance in jobs in the professional domain of their own study programmes. Graduates who possessed a high level of these competencies found jobs in their own professional domain more quickly and earned more in this domain than outside it. Graduates with a high level of academic competencies had a greater chance of finding jobs outside their own domain, where their education was less useful, wages were lower and they had to be able to adapt quickly to new conditions. Their greater learning and adaptation skills make them more inclined to take part in training activities and make them more capable to acquire the required competencies to obtain a

supervisory position. Both types of effort yield a wage increase, which means that academic competencies pay off in time in an indirect way.

It appears that each of the two types of competencies plays a strategic role for graduates in their efforts to obtain a position in the labour market. A study programme that wishes to offer its graduates good prospects in the labour market, needs both types of competencies. To bring the goals of the knowledge-based economy closer within reach and to give higher education graduates a stronger position in the labour market, the study programmes offered will need to enhance competency acquisition across the board. This means both with respect to discipline-specific competencies and academic competencies. This prompts the question whether it is possible to restructure the various study programmes in higher education in such a way that a frontier shift can be achieved with regard to the acquisition of both types of competencies. In other words, to achieve such an improvement of the effectiveness of education that both the acquisition of discipline-specific competencies and the acquisition of academic competencies are increased.

To contribute to the process of finding an answer to the second question, we have presented in this paper the results of a study of the effects of different types of learning environments and the way in which students allocate their time during their studies on the acquisition of discipline-specific competencies and academic competencies. An activating learning environment proved beneficial for a more effective acquisition of academic competencies than the other types of learning environments. If the activating learning environment is combined with a more central role of the teacher in the knowledge transfer process, the acquisition of discipline-specific competencies in this type of learning environment is also more effective than in the other types of environments. This seems to suggest that an outward shift of the educational production frontier is indeed possible.

The acquisition of discipline-specific and academic competencies can be improved further by stimulating certain changes in the way students allocate their time, insofar as these changes lead to an allocation of time that is compatible with the learning environment concerned. The research results presented here provide a number of leads for an effective adaptation of the way students spend their time. For example, this study found that attending classes (in particular if the education institute places great emphasis on this), self-study and doing work that is closely related to the study, all have a positive effect on the level of the discipline-specific competencies acquired. Work that is not closely related to the study, however, has a negative effect. Self-study and work that is closely related to the study also have a favourable effect on the level of acquired academic competencies. The study of a second subject also has a positive effect on these competencies. The effect of class attendance on academic competencies, however, is a negative one.

References

Altonji, J.G. (1995), The effects of high school curriculum on education and labor market outcomes, *Journal of Human Resources*, 30 (4), 409-438.

Bishop, J.H. (1995), Vocational education and at-risk youth in the United States, *Vocational Training*, 6, 34-42.

Corte, E. de (1990), Toward powerful learning environments for the acquisition of problem solving skills, *European Journal of Psychology of Education*, 5 (1), 5-19.

Dolton, P., Marcenaro, O.D., Navarro, L. (2001*)*, *The Effective Use of Student Time: A Stochastic Frontier Production Function Case Study*, Center for the Economics of Education, London: London School of Economics.

Durden, G.C., Ellis, L.V. (1995), The Effects of Attendance on Student Learning in Principles of Economics, *American Economic Review*, 85 (2), 343-346.

Everwijn, S.E.M. (1999), Het hoe, wat en waarom van competentiegericht onderwijs. In: Schlusmans, K, Slotman, R., Nagtegaal, C., Kinkhorst, G. (eds), *Competentiegerichte leeromgevingen*, Utrecht: Lemma.

Green, F. (1998), *The Value of Skills, Studies in Economics Series*, Department of Economics, Kent OH: University of Kent.

Heijke, H., Meng, C., Ramaekers, G. (2003), An investigation into the role of human capital competences and their pay-off, *International Journal of Manpower*, 24 (7), 750-773.

Heijke, H., Meng, C., Ris, C. (2003), Fitting to the job: the role of generic and vocational competencies in adjustment and performance, *Labour Economics*, 10 (2), 215-229.

Lisbon European Council 23-24 March 2000, Presidency Conclusions.

Mane, F. (1999), Trends in the payoff to academic and occupation-specific skills: the short- and medium-run returns to academic and vocational high school courses for non-college bound students, *Economics of Education Review*, 18, 417-437.

Meng, C. (2006), Discipline-*Specific or Academic?; Acquisition, Role and Value of Higher Education Competencies*, ROA Dissertation Series Nr. 8, Maastricht: Research Centre for Education and the Labour Market.

Meng, C., Heijke, H. (2005), Student *time allocation, the learning environment and the acquisition of competencies*, ROA-RM-2005/1E, Maastricht: Research Centre for Education and the Labour Market.

Romer, D. (1993), Do Students Go to Class? Should they?, *Journal of Economic Perspectives*, 7 (3), 167-174.

Woerden, W. van ((1997), De ontwikkeling van activerend onderwijs: probleemgestuurd leren en projectonderwijs. In: Dam, G.T.M. ten, Hout, J.F.M.J. van, Terlouw, C., Willems, J. (eds), *Onderwijskunde Hoger Onderwijs*, Assen: Van Gorcum, pp. 186-213.