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Dossier Redcom
Scientific studies
in Europe
an issue for VET



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Cedefop assists the European Commission in encouraging, at Community level, the promotion and development of vocational education and training, through exchanges of information and the comparison of experience on issues of common interest to the Member States.

Cedefop is a link between research, policy and practice by helping policy-makers and practitioners, at all levels in the European Union, to have a clearer understanding of developments in vocational education and training and so help them draw conclusions for future action. It stimulates scientists and researchers to identify trends and future questions.

The European Journal 'Vocational Training' is provided for by Article 3 of the founding Regulation of Cedefop of 10 February 1975.

The Journal is nevertheless independent. It has an editorial committee that evaluates articles following a double-blind procedure whereby the members of the Editorial Committee, and in particular its rapporteurs, do not know the identity of those they are evaluating and authors do not know the identity of those evaluating them. The committee is chaired by a recognised university researcher and composed of researchers as well as two Cedefop experts, an expert from the European Training Foundation (ETF) and a representative of Cedefop's Management Board.

The European Journal 'Vocational Training' has an editorial secretariat composed of experienced researchers.

The Journal is included in the list of scientific journals recognised by the ICO (*Interuniversitair Centrum voor Onderwijskundig Onderzoek*) in the Netherlands and is indexed in the IBSS (International Bibliography of the Social Sciences).

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The opinions expressed by the authors do not necessarily reflect the position of Cedefop. The European Journal Vocational Training gives protagonists the opportunity to present analyses and various, at times contradictory, points of view. The Journal wishes to contribute to critical debate on the future of vocational training at European level.

Interested in writing an article ... see page 80



Editorial

Issue 35 of the *European Journal Vocational Training* marks a turning point in the history of the Journal and of scientific publishing in the field of education and training.

In simple terms, this issue is the outcome of collaboration between four journals in this field which foster a comparativist approach. The decision to publish a research dossier at regular intervals on themes of common interest to all four was taken in the context of the European network set up in 2003 with financial support from DG Research, the *Réseau européen de dissémination en éducation comparée (Redcom)*. The first theme chosen is that presented in this issue of the Journal, the future of scientific studies in Europe, and the three articles forming the core of this issue will be found, together with a summary, in the final editions for 2005 of the *European Journal of Education (EJE)*, published in English, the journal *Politiques d'Éducation et de Formation (POLEF)*, published in French, and the journal *Die Hochschule*, published in German.

These three articles, preceded by an introduction by Bernard Convert of CLERSE-CNRS in Lille on the theme of *Europe and the crisis in science-based occupations*, are concerned with:

- ❑ *Scientific vocations in crisis in France* (Bernard Convert and Francis Gugenheim)
- ❑ *The situation in industry and the loss of interest in science education in Germany* (Joachim Haas)
- ❑ *Opting for science and technology in the Netherlands* (Maarten Biermans, Uulkje de Jong, Marko van Leeuwen, Jaap Roeleveld)

The dossier is complemented in each journal by articles related to the field covered by the dossier, in this case higher education, which fall within the range of issues proper to the journal concerned and to its publishing niche. In *Vocational Training*, there are two articles on vocational training in higher education, by Éric Verdier and Saïd Hanchane on *'Educational routes and family aspirations in France, a panel data approach'*, and by Emmanuel Tribu on *'Changes*

and issues in the validation of experience' in French universities.

The publication of such a dossier shared by four journals may not at first sight seem an exploit worth highlighting. However, it should be noted that each journal is published in a different language, with the exception of the *Vocational Training*, which is published in five languages (Spanish, German, English, French and Portuguese). Furthermore, the organisations sponsoring these journals vary greatly in their legal status, and operate according to widely different principles: a private research association, universities, and a European public institution.

At first, such differing organisations seem unlikely collaborators. They publish competing journals in a limited publishing market which is generally contracting year on year because of the more or less systematic reductions in the budgets accorded to the research agencies, institutes and libraries that form the bulk of their subscribers. Moreover, the number of competing academic journals has been growing regularly for the last ten years or so. In these circumstances, why would they run the risk of suggesting that their readers go and read something else? The notion seems unnatural, and is certainly not obvious.

The decision was only taken after lengthy hesitation and discussion, and it is based on intuition rather than a scientific analysis of our respective readerships. What pushed us in the direction of working together is the idea that readers who are well-informed will read more widely than readers imprisoned in their own conceptual and academic fields. Discovering other journals and themes through one's own journal can only whet the appetite for reading, and the appetite for reading comes from reading. Intellectual interest is not reduced because it is shared. On the contrary, it is sharpened and increased. The specialist, demanding readership of the four journals overlaps only very partially. They are not exactly all occupying the same niche:

- ❑ vocational education and training (*European Journal Vocational Training*)



- ❑ education policy research and analysis (EJE)
- ❑ education and training policy (POLEF)
- ❑ higher education (*Die Hochschule*)

Our four journals need therefore to learn from each other, and our readers will benefit from exploring new horizons. Our publishing initiative may encourage them to do so.

It would also seem that a new spirit is slowly but surely spreading through the reaches of education and training, stimulated by a variety of European projects and funds, and by the strategies adopted at the various European summits, from Lisbon to Maastricht via Copenhagen. The goal of a European society that both performs more efficiently and is pleasanter to live in as a result of the spread of knowledge, has lent wings to comparative research in education and training, both initial and continuing, general and vocational, and basic and higher. This in turn encourages collaborative initiatives at the European level and keeps in check our natural egoism and individualism in the name of a shared ideal, which may be fragile but is nonetheless an inspiration.

The Redcom project, of which this 'joint' issue is an initial outcome, is typical of this new European spirit. A glance at the bibliographies of education and training journals in the various countries of Europe will reveal that parallel scientific blocs exist side by side without any real cross-over. It is possible, for example, to distinguish between authors publishing in the Germanic languages, those writing in English-language publications, authors publishing in the Latin languages, those publishing in the Slavonic

languages, etc. Authors read and quote each other within these groups, but far less often between one group and another. One of the aims of the Redcom project is to help to build a bridge between the different scientific cultures and practices of education and training in Europe.

This is precisely what the European Journal *Vocational Training* sets out to do in its own field, that of vocational training, and it has therefore entered into this publishing experiment with great enthusiasm. We believe that it will be possible to publish a shared dossier about every two years within the Redcom network, and we are already planning to look in the 2007 dossier at the issue of the evaluation of research conducted with various types of European funding (ESF, DG Research, DG EAC, etc.).

The Redcom network is not a closed club. Indeed, we would like to open it up to other journals concerned with education, training, the relationship between education and employment, and that between work and training. In the coming months we shall therefore be contacting our sister journals, and we shall warmly welcome any proposal for collaboration that may be sent to us.

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For the Editorial Committee of the *European Journal Vocational Training*

Éric Fries Guggenheim, Editor-in-Chief



Redcom: Réseau Européen de Dissémination en éducation COMparée



Jean Gordon

Building a European knowledge society requires profound changes in education and training. From this arises the need for appropriate information on education research, policies and practice to be readily accessible to researchers, policy-makers and practitioners across the EU Member States and in accession and in neighbourhood countries. Redcom aims to create an open, multilingual and multimedia network to support the dissemination of research and policies resulting from international comparisons in education. Its target audiences are the European research community, policy-makers, professional associations and practitioners, and a wider audience of actors in the educational field.

The network essentially comprises academic journals, specialised in comparisons of education and training policies and evaluating good practice in a European perspective. These are published in different EU languages and are supported by an online observatory on education and training policies and practice, designed to provide a resource base for policy-makers and practitioners across Europe.

There are many high quality journals in Europe specialised in different aspects of education and addressing different types of audience in different languages. Some are European or international in their core perspective, others are national but may include a comparative element. Increasingly, journals are edited by international editorial boards. Whatever their specific aims and structures, they all address, explicitly or implicitly, how to continue developing in an increasingly networked society and the potential for future dissemination policy of online publication. Redcom was designed in this context to encourage developing net-

works of publications and to emphasise the advantages of cooperation: broadening audiences for everyone; providing a broader platform for the publication of high quality articles; joint reflection on seminal and topical themes, etc. It also allows journals to pool their reflections on the future role of Internet in dissemination. In addition, a network of journals published in Europe enables the editors to present a European vision of the selected theme in several languages.

The first phase of building the network is a two-year project funded by the Directorate General for Research of the EU. The project is coordinated by the European Institute of Education and Social Policy and the partners are the *Wissenschaftliches Zentrum für Berufs- und Hochschulforschung (WZ1)* of the Universität Kassel, and the *Institut Européen pour la Promotion des Innovations et de la Culture dans l'Education (Institut-EPICE)*. The *European Journal Vocational Training* (edited by Cedefop) joined the project in July 2004.

The project has developed three main activities, the first of which is an online observatory specialised in European education and training research and policies (www.e-education-europe.org). This was launched in February 2004 and has been designed with the intention of developing a resource base for policy-makers and practitioners across Europe. It takes stock of current developments in education research, seeks to identify new issues and proposes thematic dossiers. Currently, the website includes pages on European perspectives (mapping the Europe of education and the Lisbon process), thematic dossiers on the Bologna process and lifelong learning, and a first thematic dossier on higher education research.



A major area of reflection has been the implications of the recent progress made in on-line publication, raising issues such as the types of scientific validation possible through online editing of academic articles and comparative visibility in relation to paper publication. Furthermore, online publishing of existing journals entails different rhythms and calendars from traditional paper-based publications as there is no *a priori* reason to maintain term-based or semester-based publication intervals. Online publishing questions whether choice should be continuous, regular publication of individual articles or contributions rather than complete issues or groups of articles around a theme. Paper-based publication, on the whole, has a clear definition of a finished product; online publication editorial teams have to rethink this notion.

The second project activity was a seminar organised in March 2005 entitled Creating a European knowledge base on education: the potential of European Union-supported research in the field of non-school education. The seminar tackled key issues on the generation and use of European knowledge on education, focusing on non-school education (vocational education and training, higher education and adult education). It brought together the 'producers' (researchers involved in European Union-supported projects) and the 'users' of European knowledge (European and national policy-makers and those in leadership positions at education institutions). It centred on the following three topics:

- ❑ stocktaking and perspectives with respect to the European knowledge base on non-school education;
- ❑ transferability of research findings and dissemination;
- ❑ best practice in designing and implementing transnational research projects in non-school education.

The outcomes of the seminar were published online (www.e-education-europe.org). There was an overall agreement that further European knowledge – as opposed to knowledge existing at national level – is needed. It was suggested that knowledge could be understood as information coupled with a conceptual framework, that is, information interpreted from a specific point of view. A brief summary of the findings follows:

- ❑ cooperative work in changing teams of transnationally experienced experts was expected to produce the best possible results with respect to generating European knowledge;

- ❑ efforts should be made to develop the validity of available information as far as possible and to transfer research results into educational and political practice. To assess project findings, after submission of a project report, the findings of a project should be evaluated in a similar manner as when selecting from project proposals, and possibly by the same evaluators;

- ❑ priorities in European research should be defined by policy-makers and researchers together with the social partners. Several specifically policy-relevant themes can be identified which are not covered by transnational research and therefore deserve special support by policy-makers. Important further issues are identifying the end users of information and creating new projects. More communication and transparency are needed to stimulate these processes;

- ❑ the presentation of knowledge according to different contexts is fundamental to the visibility and understanding of different types of end user. In principle, researchers cannot be expected to be experts in knowledge transfer and dissemination. Advisory bodies could support research projects, or 'knowledge-organising agents' could be trained to bridge the perceived gap between the scientific community and different communities of end user. Knowledge organisation should be regarded as a distinct function;

- ❑ different means of knowledge dissemination exist, the most important being the Internet. For successful dissemination, knowledge of good quality has to be selected and to be made easily accessible to its most important end users;

- ❑ policy-related knowledge is, by definition, time-critical and not stable. Monitoring activities are needed for storing the knowledge resulting from transnational projects. Moreover, databases should be built to give access to longitudinal information.

The third project activity concerns the journals directly. This is the first joint issue published by the network. At present, the jour-



nals are: *European Journal of Education*, *Politiques d'Éducation et de Formation*, *Die Hochschule* and the *European Journal of Vocational Training*. The joint issue will present an exploration of a jointly agreed theme in four journals published in five languages. The group of journals and the partners of Redcom are convinced that this is a good means of developing the dissemination of a European perspective on selected themes in education and training. Redcom is, therefore, seeking to broaden and continue building the network of journals in 2006.

This joint issue was designed and edited by an ad hoc editorial committee which included members of the editorial boards of each journal. The focus and scope of the issue is presented in more detail in the editorial which follows. The overall theme selected for this first joint issue is a subject which is under discussion at national and European levels. It is the issue of scientific studies in higher education in Europe from different points of view, including changes in enrolment patterns and the implications both for the European Research Area and for the development of professional competences. Each of the journals is taking a specific focus, depending on its readership and chosen editorial perspective. The titles and dates of publication are as follows:

- for the *European Journal of Education*: Scientific studies in Europe and the ERA (December 2005),
- for the *European Journal Vocational Training*: Scientific studies in Europe: an issue for VET (May to August 2005),

- for *Politiques d'Éducation et de Formation*: *Les études scientifiques en Europe l'approche comparative* (December 2005),

- for *Die Hochschule: Naturwissenschaftliche Studien in Europa* (October 2005).

At this stage, one of the outcomes of the Redcom project has been to underline the growing importance of working in networks to create synergies. Networking is much more reliant on ICT-based tools than previously, hence the importance of linking journals to web-based tools for communication and interaction. A second outcome focuses on the need for methods and mechanisms for interpreting research results in terms which address decision-makers and practitioners. The central question posed is that of appropriate interfaces between creating new knowledge (research) and its interpretation, dissemination, and vulgarisation for decision-makers and practitioners. The project has sought to respond in terms of networking of existing journals and teams, as well as creating new web-based approaches to dissemination and establishing the links between the two approaches. The project has enabled considerable reflection by partners on major questions concerning research and appropriate dissemination to policy-makers and practitioners. Networking journals with comparable objectives, edited in different languages, presents a challenge for dissemination of a European perspective and offers new challenges for web-based dissemination.



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Europe and the crisis in science-based occupations

At the time when Europe was committing itself to a knowledge economy under the Lisbon strategy, a number of European countries were facing a crisis in the number of young people taking up science occupations. During the 1990s in Germany, France, Italy and the Netherlands (to cite just a few examples) the numbers of students enrolling at universities specialising in the sciences declined every year. Moreover, Europe was not alone in suffering from 'loss of interest in scientific studies' syndrome and to face the looming risk of a shortage of scientists. In the past 30 years, the United States have also seen a very marked erosion in the number of young people graduating in the basic sciences, i.e. mathematics and physical sciences (¹), and a corresponding rise in disciplines such as law and business (²). The appearance of the same symptoms in a number of European countries has alarmed education authorities, seized the attention of the media and led scientific associations to extensively discuss the issue. At the same time, several initiatives were developed throughout the European Union: innovative teaching experiments from primary school upwards, measures aimed at strengthening the links between secondary schools and universities, measures directed at groups comprising 'reservoirs of talent' (girls, young people from immigrant groups etc.), and others.

In proposing to revisit, in this series of articles, the dimensions and causes of the phenomenon, not for a moment do we intend to dispute the value of initiatives which mobilise enthusiasm and skills. We wish, rather, to put readers on their guard against interpreting these symptoms over-hastily: to do so would compromise the effectiveness of the measures they have inspired.

The articles brought together in this special report first demonstrate certain similarities between European countries, particularly in terms of the image younger generations have

of scientific studies. It seems that these are seen everywhere as being the most 'difficult' subjects. The figures confirm this difficulty. As the article by Biermans et al. shows, Dutch students who took the scientific stream in secondary education, but later opted for a non-scientific subject in higher education, believe that any non-scientific discipline offers them better prospects of obtaining a degree than the sciences do. The French article shows that those who have taken a science-based baccalaureate do better than other baccalaureate holders in all disciplines; but though the best of them choose scientific disciplines it is in these that they are least successful.

Granted that scientific subjects both appear to be and are indeed difficult, why is this reputation for difficulty dissuading many more students from studying them today than in the past? My hypothesis is that this reluctance is linked to another, contemporary development, which is being experienced simultaneously in all the countries of Europe. I refer to the very strong current growth in the numbers of students and the reduction in academic (and social) selection that this necessarily involves. The number of students is known to have more than doubled in the European Union in the course of the last 25 years, with particularly large increases (tripling or quadrupling) in Portugal, Greece, Spain and Finland (the Member State that has experienced the weakest growth is Germany, with 50 %) (³). Consequently, the current student population in Europe, *on average less subject to academic selection* than was the case in the past, is, I believe, more inclined to draw back from the assumed difficulty of scientific subjects – all the more today, since this reputation for difficulty is not offset either by the existence of particular growth markets (except, of course, computer science), or by a particularly positive image of science and technology in the minds of younger generations (as may have been the case in the 1960s and

(¹) This phenomenon is less striking in Japan. The number of university students virtually doubled between 1970 (1 300 000) and 2003 (2 500 000), while the percentage of young people studying sciences increased slightly, but remained low (3.5 % in 2003), and the percentage of engineering students declined from 21.1 % to 17.8 %, but it now includes a much larger number of women. Source: MEXT statistics. In the case of (French-speaking) Canada, sociologists explicitly dispute the idea that there has been a decline in the interest of students there in the sciences. See Foisy M., Gingras Y., Sérigny J., Séguin S., Portrait statistique des effectifs étudiants en Sciences et en Génie au Québec (1970-2000), *Bulletin de l'enseignement supérieur*, October 2000.

(²) In the United States, the trend in the numbers of graduates gaining Master's degrees has been as follows: taking the 1970 figures as a base, the index figure for the overall total of Master's graduates was 203 in 2000, with the individual levels being 59 for Masters in mathematics, 80 for physical sciences and science technologies, and 111 for biology. In contrast, the index figure for computer science was 1010, and that for medical occupations was 759. Non-scientific disciplines which have experienced very strong growth are business (index figure 448 in 2000) and law (index figure 401). Sources: *National Center for Education Statistics*, Department of Education, USA.

(³) *Key data on education in Europe 2002*, European Commission, Eurydice, Eurostat, EUR-OP, Luxembourg; Office for Official Publications of the European Communities, 2002, 298 pp., Figure 4, Chapter F-5.



1970s, for example, with the high points of the conquest of space and some spectacular medical innovations) ⁽⁴⁾. Today, both media and fiction mostly celebrate the worlds of law or business.

Employment-based portrayals of science subjects also regard them as less 'profitable' today than other disciplines in terms of job quality and pay levels. This is brought out especially by the Dutch article. Good students whose secondary education had prepared them for a science-based course at tertiary level still rejected this in favour of disciplines they regarded as both less difficult and more 'profitable', such as economics, law or medicine, while other students contented themselves with social science or humanities, which they concede to be less 'profitable' but which they nonetheless see as greatly increasing their likelihood of obtaining a qualification.

However, over and above the similarities that can be seen between countries – which in my view stem from the fact that all the European countries are simultaneously experiencing strong growth in and democratisation of their student populations – profound differences continue to exist, resulting in apparently similar effects sometimes having very different causes. To take an example, Germany and France have both experienced a marked decline in the numbers of students reading chemistry at virtually the same time (i.e. in the course of the 1990s). Yet, as demonstrated by the articles devoted to each of these countries, the underlying reasons are very different: competition from technology-based courses in the case of France and negative signs on the labour market in Germany. A straightforward international comparison of European statistics, essential though it is, would not have sufficed to draw out these conclusions; each of the figures needed to be situated in its own national context. The decision to study chemistry at university in France cannot be interpreted without considering the alternative options, vocational streams or the *Grandes Ecoles* [institutes of higher education with competitive entrance examinations], which, despite harmonisation measures, continue to be specifically French systems; similarly, university admissions in Germany cannot be interpreted without considering alternative solutions available to holders of the *Abitur* [school-leaving qualification entitling the holder to enter higher

education], particularly the tradition (completely unknown in France) of entering the labour market via vocational training before, or instead of, going to university. Straight away, the same decision – to enrol on a chemistry course at university – may have two completely different meanings for a German and a French student. Not only do higher education structures taken as a whole remain very different – despite action taken to harmonise university systems – but more fundamentally, the very meaning of the higher education system within each national society, its relationship with employment, and its position in individuals' personal career paths all vary. In fact, one can say without fear of exaggeration that 'studying' does not mean the same thing in Germany, France or Italy. To reduce the comparison to a simple comparison of figures derived from European statistics would be to lose a substantial element of these meanings.

The issue of a loss of interest in scientific subjects offers a good opportunity to observe these differences and their effects. In seeking the reasons for the fall in the number of young people studying in science faculties, writers attach more or less importance to the labour market or to the functioning of the education system. In the case of Germany or the Netherlands, the labour-market explanation is dominant. In the case of France, the dominant theory attributes the problem to the structure of the education system, although to explain certain choices, reference is made to the labour market. Of course these differences in approach are due to differing national traditions of education sociology; but these in turn owe much to the way in which the education system actually works and to the relationship between the education system and employment.

A comparison between Germany, Italy ⁽⁵⁾ and France shows three ideal types of relationship between training and employment, and also three ways of explaining symptoms that appear similar.

The entire German education system is, as we know, characterised by a preoccupation with academic guidance and integration into society and the labour market ⁽⁶⁾. As shown by Joachim Haas's article, certain fields of employment in Germany operate as compartmentalised markets, clearly defined and closely associated with a study discipline – physics, chemistry, and mechanical and elec-

⁽⁴⁾ On the other hand, if we are to believe the opinion polls, at least in France, the image of science and of science-based occupations has not really suffered as a result of the 'damage' caused by progress in the past 15 years. See Boy, D. *Le progrès en procès*. Paris: Presses de la Renaissance, 1999.

⁽⁵⁾ In the case of Italy, reference is made to Teresa Longo's book: Longo, T. *Scienze, un mito in declino? La crisi delle iscrizioni alle Facoltà scientifiche: Italia, Francia, sguardo internazionale*, Stamperia Editoriale Pisania, 2003. See also the article published in *Revue Polef* in addition to this special report, appearing in all of the Redcom Network's four journals: Teresa Mariano Longo. "La crise des inscriptions dans les facultés scientifiques en Italie", in *Politiques d'Education et de formation*, 2005, No. 15-2005/3.

⁽⁶⁾ Francine Vaniscotte sees this as a specific feature of the 'German type' of education. See Vaniscotte, F. *Les Ecoles de l'Europe : Systèmes éducatifs et dimension européenne*. Paris: INRP, 1996.



trical engineering are university disciplines closely associated with certain industrial market segments (holders of engineering degrees are even seen as having their careers mapped out). Consequently, the decision to study one of these disciplines owes a great deal to the signals emitted by these market segments (sometimes even by a single company serving as a symbol, like Siemens), and is far from reflecting a loss of interest in science. The (temporary) desertion of these disciplines occurs in response to negative signals (redundancies, difficulty in getting a job, etc.). The succession of shortages and excess numbers resulting from decisions influenced in this way and facilitated by the great flexibility of the education system's capacity explains the cyclical nature of the numbers of enrolments in these disciplines, strikingly apparent in long-term analysis. Since the end of the 1990s, the numbers enrolling to study physics, chemistry and engineering sciences have been rising again in Germany, confirming this cyclical aspect.

The Italian situation is poles apart from that of Germany. In Italy there is very little connection between higher education and employment, a state of affairs that applies to the sciences as to other disciplines. Italy has few mechanisms responsible for linking training and employment, either in providing effective guidance services on admission to higher education or in assessing and promoting the labour-market integration of graduates. The concept of assigning precisely defined vocational objectives to the higher education route pursued is quite foreign to students choosing their path. Moreover, vocationally oriented higher education was created very late in Italy, and appears to have met with only limited success⁽⁷⁾. Universities remain far and away the most important institutions providing higher education (with the exception of art academies). The choices made by students may be strongly affected by reasons such as the geographical distribution of educational provision. Italian universities are still relatively specialised around traditional disciplines (Pisa for the sciences, Bologna for law, etc.), and the proximity of a discipline alone may itself be a reason for the choice, particularly for students from modest backgrounds. Moreover, Italian universities are still a world apart, less open to society at large than is the case in other countries, and are proving slow to reform. They have a very heterogeneous student base and the average student has a high rate of fail-

ure and of repeating years⁽⁸⁾. There are no special arrangements favouring science subjects. If anything, the reverse is true. University decentralisation, which has involved the creation of 'branch' universities close to centres of population, has rarely involved science faculties; in a country where students are sensitive to the effects of proximity this has helped to reduce the average rates of enrolment on science courses. It should also be noted that national authorities make a limited attempt to support scientific research, and that the dynamism of the Italian economy is mainly based on industries with low scientific and technological content and which therefore call for few high-level scientific or technical managers. Given these conditions, in cases where science graduates find good, well-paid jobs it is not so much because employers are taking advantage of their specific skills (unlike in Germany, science graduates are often employed outside their field of study), as because a university science degree serves as a 'label', and the know-how and methods acquired by scientists equip them with a substantial degree of flexibility.

The French situation is different again. France is known as a country where the prospect of career advancement is very strongly associated with education. Career options are more closely bound up with the level of initial education/training than in other countries. At the same time, the education system is extremely hierarchical. The *Grandes Ecoles*, accessible only via highly selective entrance examinations, are at the top, well above the universities. Universities are also subjected to intense competition from vocationally oriented higher education options with selective admission. Unlike their German counterparts, in choosing a course of study young people in France attach more importance to academic hierarchies than to labour-market prospects. To be more precise, the greater the academic success (and the higher the social origin), the later in their academic career the students address the issue of their prospects. The advent of new generations of students subject to less academic and social selection has assured the success of vocationally-oriented higher education with this group, who prefer it to university not necessarily because it offers more specific professional options but because its selective nature at the entry point promises better career prospects. Even within science-based universities, theoretical science cours-

(7) Longo, op. cit., p. 18.

(8) See also Vaniscotte, F. *Les Ecoles de l'Europe: Systèmes éducatifs et dimension européenne*. Paris: INRP, 1996.



es are, for the same reasons, facing competition from the applied-science and technology courses developed there during the 1990s.

Joint initiatives have been put in place in these various countries in an attempt to combat the crisis in science-based occupations ⁽⁹⁾.

In Germany, they are based on consultation of three collective players – the Federal state, the education authorities administered by the *Länder*, and the business world (sectoral institutions, enterprises, engineering associations, etc.). A consensus was first achieved among these players to avoid over-dramatising labour-market signals likely to trigger a shortage of applicants enrolling on science and technology courses, and then to promote study of these disciplines. Enterprises and professional associations are increasingly campaigning to promote scientific and technological occupations (competitions, technology and science fairs, enterprise open days, aimed at young women in particular, and so on), and are also increasingly co-managing local networks of secondary schools/ universities/ enterprises. The Federal state is promoting pilot educational projects and research on the subject and is offering student grants involving positive discrimination in favour of young women undertaking science and technology studies. In a number of *Länder*, the education authorities are placing emphasis on reforming secondary science education with a view to providing more scope for experimentation and technology, and on the link between secondary schools and universities.

In Italy, a project entitled “lauree scientifiche” was presented by the Ministry of Education in October 2004, in consultation with the Manufacturers’ Association and the Conference of University Presidents. This project has been given a budget of 8.5 million euro and is aimed at increasing the numbers of enrolments in science faculties, especially for mathematics, physics and chemistry. This initiative is designed to rectify the lack of connection between higher education and employment mentioned earlier, and to promote scientific studies. It includes improvements to the system for information on occupations, improved career guidance (self-evaluation tests), systems aimed at better matching supply and demand in respect of skilled science-based work, the creation of grants to encourage enrolment in science

faculties (here too, this includes positive discrimination in favour of young women), the development of partnerships between universities and secondary schools, etc.

The education authorities in France have also increased the number of educational experiments, at nursery and primary school levels (*La main à la pâte* [let’s muck in]), at secondary school level (scientific Olympiads) and in universities (specific support for six universities that are overhauling their teaching in the first stage of courses in the physical sciences). The education authorities have encouraged closer links between secondary schools and universities by appointing academic project leaders for the sciences and financing campaigns to make secondary school pupils more aware of scientific practices (‘travelling physics’, ‘travelling chemistry’). These campaigns have been conducted jointly by secondary school and university teachers. As yet, the authorities have not undertaken large-scale initiatives of the kind seen in Italy. The most recent major initiatives encouraging students to study for teaching occupations (allowances for university teacher training institutes) date back to the early 1990s. They lasted for only a few years and did not include specific science-oriented measures.

In any case, the articles collected here show that the ‘crisis in science-based occupations’ can have many faces from one European country to the next. Although it is essential to promote sciences and a science-based culture, this alone will not always be enough to combat trends whose causes lie elsewhere ⁽¹⁰⁾ – in the industrial climate in Germany, the geographical distribution of higher education provision in Italy, and the structural trend in provision and demand for training in France.

In Bologna and Lisbon, Europe acknowledged the differences between the higher education systems in the Member States and affirmed its desire to develop a European higher education area. Examining a phenomenon such as the ‘crisis in science-based occupations’ which is common to many Member States and yet differs according to specific national characteristics provides an insight into the path that has still to be travelled. The most persistent differences lie not so much in education structures as in the position occupied by higher education in individuals’ career paths and life plans.

⁽⁹⁾ I should like to thank Francis Gugenheim, Joachim Haas and Teresa Longo for the information they have given me on the public policies adopted in France, Germany and Italy.

⁽¹⁰⁾ The media, inclined as they are as a result of their conditioning to celebrate the power of events and to take social phenomena at face value, overestimate the importance of promotional measures designed to boost the image of science. This is how the French newspaper *Le Monde* (29 January 2005) came to attribute the increase in enrolments in physics faculties in Germany to the organisation of a Year of Physics in that country in 2000. Yet statistics show that physics enrolments in Germany had already begun to increase in 1998. See Troendle, G. *Mapping Physics Students in Europe*. Mulhouse: European Physical Society, 2004.



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Since the mid-1990s, increasingly fewer French students have been enrolling for science subjects at university. Speaking of a 'loss of interest in science among young people' is nevertheless premature. The phenomenon is primarily due to socio-demographic changes. As a result of their position in French higher education, universities, which do not operate a selective admission policy, are a last resort for students rejected by the selective options. Between 1985 and 1995, when student demographics grew apace, universities absorbed most of this growth. After 1995, the supply of selective training increased, while student demographics stagnated. As a result, university enrolments have declined, especially in the sciences. At the same time, holders of science baccalaureates have not been as top-notch, educationally and socially, as they were fifteen years previously. These students from more modest backgrounds and performing less well in education are shying away from the sciences which are reputed to be more difficult and less 'profitable' than other subjects.

(¹) Readers unfamiliar with the French education system should refer to the annex.

Scientific vocations in crisis in France:

Explanatory social developments and mechanisms

Introduction

France is striving, like the rest of Europe, towards a 'knowledge economy', and is concerned, along with a number of its European partners, about the renewal of its scientific elites. Since the mid-1990s, increasingly fewer students have been enrolling for scientific disciplines at university; physics and chemistry were the first to be affected, followed by biology and mathematics. These very real symptoms, to be found in other European countries as well, may have led to an overly hasty diagnosis: 'a loss of interest in science among young people'. In this article, we shall try to show that, in France at least, there are other explanations for this development. In France, theoretical university courses are competing with short vocationally-based options and with the *Grandes Ecoles* and their preparatory classes which are, in French eyes, at the top of the educational ladder (¹). Within universities themselves, theoretical scientific disciplines are competing with the technological subjects which have been introduced more recently. Choosing to study science at university has to be seen in the context of this system. For twenty years, the higher education supply and demand have been undergoing far-reaching morphological changes which have, over the years, greatly changed the composition of the student population and the opportunities for access to the various types of education: on the demand side, student demographics grew apace from 1985 onwards, making higher education much more democratic, but started to stagnate after 1995; on the supply side, technological and vocationally-based courses have continued to increase over the last twenty years, outside and even within universities, and enrolments in these courses are now on a par with enrolments in theoretical education.

The thrust of this article is that socio-demographic changes have brought about this decline in enrolments in theoretical science disciplines. The article has four parts. The extent of the problem is examined in Part I. The extent to which the decline in enrolments in theoretical university disciplines is due to the combined effects of the hierarchy of education and student demographics is analysed in Part II. Our observation is that these causes have had the same effects in all university disciplines (with the exception of sports subjects). Part III shows that there is nevertheless a specific problem with science studies connected, in our opinion, with the trends in the population of young people leaving school with science qualifications. Lastly, the relative replacement of theoretical science by technology in the choices of students with science baccalaureates is examined in Part IV.

The decline in enrolments for science education: myth or reality?

First of all, is this decline in enrolments in science universities the real picture? Or is it one of those alarms set off by symptoms hastily headlined in the media that a more systematic analysis would show to be misleading or wrong? The answer is not clear-cut. Since 1995, there has indeed been a substantial decline in enrolments in theoretical science disciplines in universities, but this decline has also affected medicine, the arts and humanities and law; numbers in technology and applied sciences are nevertheless on the increase. Statistics from the Ministry of Education (see Table 1) show that the total number of students in France fell slightly between 1995/96 and 2000/01 (-0.3%). Over the same period, numbers in university science faculties fell by 11%, the hardest hit being physics (-46%) and life sciences (-14%). In technology and applied sciences, however, numbers increased



Trends in student numbers in science streams between 1995/96 and 2000/01
(Metropolitan France + overseas departments and territories)

Table 1

Streams	Total numbers		Trend (as %)	Including first cycle		Trend (as %)
	1995/96	2000/01		1995/96	2000/01	
University - sciences (1)	320 346	284 156	- 11,3	149 688	118 956	- 20,5
<i>Including Physics</i>	68 130	36 651	- 46,2	45 689	24 359	- 46,7
<i>Natural and life sciences</i>	97 871	84 374	- 13,8	53 516	39 179	- 26,8
<i>Industrial sciences and technology</i>	39 521	52 399	+ 32,6	8 412	10 891	+ 29,5
<i>Computer science</i>	12 186	17 009	+ 39,6	392	1 263	+ 222,2
University - healthcare	152 811	140 669	- 7,9	55 821	46 877	- 16,0
University - sciences + healthcare	473 157	424 825	- 10,2	205 509	165 833	- 19,3
IUT, production sector (2)	47 256	51 917	+ 9,9	47 256	51 917	+ 9,9
IUT, computer science	7 399	9 934	+ 34,3	7 399	9 934	+ 34,3
STS, production sector (2)	87 049	89 686	+ 3,0	87 049	89 686	+ 3,0
CPGE, sciences	47 875	44 373	- 7,3	47 875	44 373	- 7,3
Engineers (3)	53 663	62 089	+ 15,7	8 366	10 349	+ 23,7
Total of scientific and technical streams	716 399	682 824	- 4,7	403 454	372 092	- 7,8
University, excluding sciences and healthcare	909 337	882 862	- 2,9	480 847	434 390	- 9,7
Non-scientific streams outside universities (4)	306 292	322 861	+ 5,4	220 227	242 488	+ 10,1
Total of non-scientific and non-technical streams	1 215 629	1 205 723	- 0,8	701 074	676 878	- 3,5
Total (1)	1 932 029	1 888 547	- 2,3	1 104 528	1 048 970	- 5,0
Grand total	2 167 436	2 161 064	- 0,3			

Sources: Lixi et al, 2001.

Ministry of Youth, Education and Research, 1996 and 2003.

(1) Including university engineering schools.

(2) Leading to occupations in industry or laboratories and therefore excluding administrative occupations.

(3) Not including university engineering schools.

(4) Not including schools of commerce, law and administration and schools of art.

over the same period, in both universities (+33 % in industrial technology, +40 % in computer science) and technology colleges (+16 % in engineering schools, +10 % in the Instituts Universitaires de Technologie [IUTs – University Technology Institutes] preparing for industrial or laboratory occupations, +3 % in the Sections de Techniciens Supérieurs [STSs – Higher Technician Sections]).

In the more recent period for which statistics are available, between 2000 et 2002, the number of students taking science subjects in universities seems to have stabilised (-0.9 %). A more detailed analysis nevertheless shows that this stabilisation is due in the first instance to a sharp rise in numbers of foreign students, in particular from Africa and more recently from Asia. After years of decline, this increase in the number of foreign students, starting in 1999, began to affect the global trend in science numbers from 2001 onwards. These variations suggest that policies to take in this population offset, with a time lag, demographic trends among the native student population.

The combined effects of the hierarchy of education and school demographics

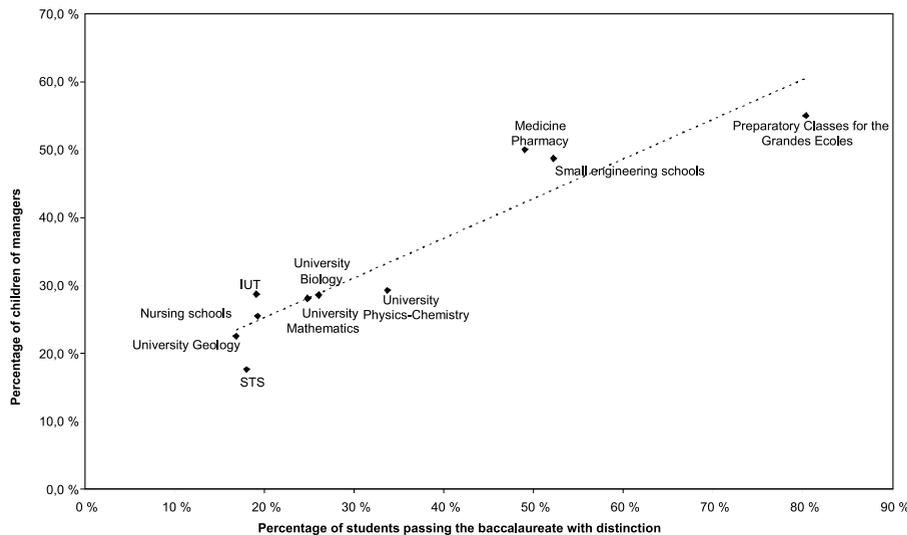
For pupils gaining a science baccalaureate, enrolling to study science at university has to be balanced against alternative choices: the Preparatory Classes for the Grandes Ecoles (CPGEs), engineering schools admitting students with baccalaureates and short vocationally-based courses: IUTs, STSs, nursing schools. All these courses are in an educational and social hierarchy, of which the following graph gives an overview; in this graph, each type of education is characterised by the profile of the lycée pupils wishing to enrol in it (2): their educational profile (abscissa: percentage of students passing the baccalaureate with distinction) and their social profile (ordinate: percentage of children of managers). This graph shows that the profile of students choosing to study science at university is very different from the profile of pupils choosing to study in the CPGEs, engineering schools or in medicine. The former have been much less successful at school and are much more often from modest back-

(2) We used, for this purpose, individual data files containing a list of preferred choices of higher education for each pupil in the final year of the lycées of the Académie of Lille. This indicates their educational intentions or entrance applications. The selection process takes up this list of preferences. Account is taken here and in the rest of this article only of the first choice in the student's list.



Higher education in science and technology in terms of the educational and social profile of lycée pupils choosing the various options (Académie of Lille, 2001)

Graph 1



grounds. In both these respects, they are more or less on a par with pupils choosing the IUTs.

This graph is based on educational intentions. At the time of actual enrolment, universities, which are the only higher education institutions not to operate a selective admission policy, will receive, in addition to students choosing them, students refused entry to the CPGEs or deciding against this choice themselves, and students refused entry to the short technology streams or considering that there is no point competing for them ⁽³⁾. This is a paradox of French higher education, on which education experts have often commented (Schwartz, 1983; Crozier, 1990; Jallade, 1991), but which has long been felt to have no effect by those making the decisions: selective vocational courses, such as the CPGEs and IUTs, often attract, precisely because of their selective nature, students likely to be successful in theoretical university courses, while, in contrast, a large proportion of those entering theoretical university courses, with no entrance selection, are students who have been refused by the selective streams and who are often less suited to theoretical education. The same contradiction can be seen from the point of view of teaching methods: university education is based around individual autonomy, whereas university students, often of an average educational standard and from modest social backgrounds

(apart from medicine) are in particular need of teaching support; in contrast, in the case of the best students – those in the CPGEs – and generally for all students enrolled in selective courses, teaching methods are based around strict supervision.

The major variations in student demographics in France since the mid-1980s have to be seen against this backdrop. From 1985 to 1995, the numbers of lycée students obtaining the baccalaureate grew to an extent unprecedented in French school history, led by the then government's wish to get '80 % of an age cohort to baccalaureate level'. During this period, the number of students with general and technology baccalaureates increased by 64 %. At the same time, the selective higher education streams, especially the CPGEs and IUTs, although showing fairly sustained growth themselves, absorbed only a small proportion of these numbers. Universities had to take in most of this wave of new baccalaureate students. Between 1985 and 1995, numbers in the initial science cycles of universities more than doubled (+113 %).

Every year during this period universities enrolled students from increasingly modest backgrounds and with falling levels of performance ⁽⁴⁾, without this democratisation going together with any change in selection and teaching methods. Maintaining the status quo made it possible in practice to increase numbers at the lowest cost, the average expenditure per student, borne chiefly by the state, being much lower for theoretical university education than for the other types of higher education.

During these same years, the main concerns of the state and local authorities (increasingly being asked to play their part in financing an increasingly decentralised higher education supply) were quantitative: the main aim being to find places at university for an ever increasing number of pupils obtaining baccalaureates. Qualitative concerns, reflected by evaluations of teaching methods and student success, came to the fore only in the later period when the growth in numbers started to tail off.

There was, however, a sea change from 1994/95. After several decades of growth, the rate of entry for the baccalaureate of an age cohort peaked (around 62 %). Moreover, the number of pupils obtaining the gener-

⁽³⁾ A recent study by the Ministry of Education shows that 62 % of the students enrolled in the initial science cycles of universities would have chosen a different option, had it been possible.

⁽⁴⁾ As lycées are opening their doors ever wider every year, pupils who would previously have been channelled into vocational education at the end of the third year, because of their poor school performance, are now being offered places in general and technology lycées.



Numbers of pupils with baccalaureates and students in CPGEs, IUTs and initial university science cycles **Table 2**
Change from 1985/86 to 1995/96 (whole of France)

	Pupils with general and technology baccalaureates	CPGEs	IUTs	Initial university science cycles
1985/1986	253 050	47 334	60 715	70 422
1995/1996	415 502	70 288	96 158	149 688
Trend	+ 64 %	+ 48 %	+ 58 %	+ 113 %

Source: Ministry of Youth, Education and Research, 1987 and 1996.

Average expenditure per student (2002 in euro) **Table 3**

Universities (excluding IUTs and university engineering schools)	IUTs	STSs	Engineers	CPGEs
6 850	9 100	10 870	11 910	13 220

Source: *L'état de l'école*. Ministry of Education, Programming and Development Directorate, October 2003.

Trends in flows entering the first year of the main higher education options (France, index 100 in 1990/91) **Table 4**

	1990/1991		1995/1996	2000/2001
Universities as a whole	228 379	100	122	107
IUTs	33 607	100	129	147
STSs	104 359	100	106	113
CPGEs	34 950	100	110	103
Nursing schools	24 800 (*)	100	115	125

Sources: Lixi et al, 2001.

Ministry of Youth, Education and Research, 1996 and 2003.

(*) For nursing schools, entry flows have been estimated from stock figures.

al baccalaureate decreased and the number of pupils with technology baccalaureates and in particular 'vocational' baccalaureates, who tend to go straight into the labour market, increased. The number of applicants for higher education consequently fell and its trend therefore became very dependent on the demographic trend of this age cohort which is set to decline between 2000 and 2010.

Universities then started to face recruitment problems; problems heightened by the fact that, at the same time, the supply of selective courses in IUTs, STSs and nursing schools, was continuing to increase (see Table 4). With the number of higher education applicants falling and the supply of short vocationally-based options increasing, fewer applicants were ipso facto rejected by these options and therefore fewer students were left with university as their only option.

While this development has undoubtedly affected the sciences, it has also affected the arts and humanities and law ^(§); opinion, however, has tended to focus only on the 'loss of interest in the sciences'.

A hidden development: the fall in applications for the preparatory classes

The sciences are nevertheless the disciplines that have been most radically and most durably affected by the decline in numbers. There is undoubtedly a problem specific to the sciences, whose symptom is to be found less in the mechanisms described above than in a far less visible development: the decline in intentions to apply for the CPGEs.

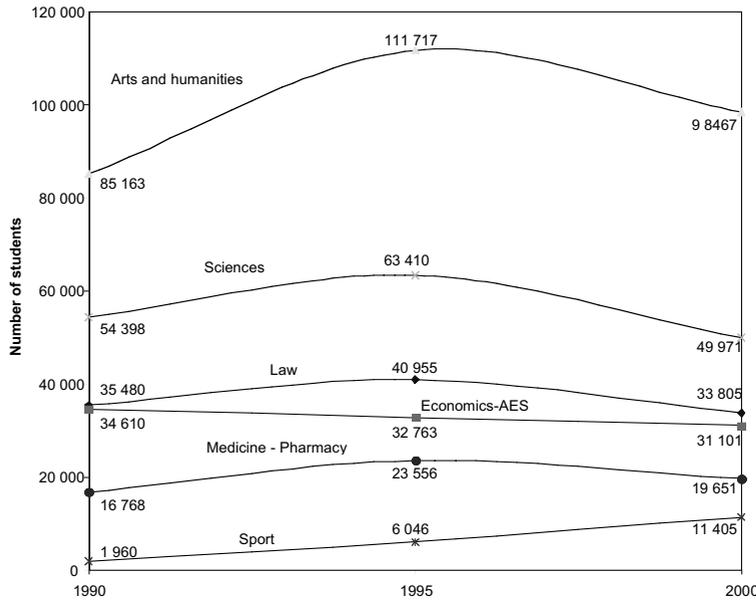
It is evident from statistics showing educational intentions (see footnote 2), rather than actual enrolments, that the relative stability of the number of students enrolling for the CPGEs masks the fact that applicants for these classes, although continuing to exceed the numbers actually enrolled, are far fewer in number than before. The statistics on the educational intentions of lycée students in the mathematics-physical sciences streams (final year C prior to the 1995 baccalaureate reform and final year S, mathematics specialisation and physics-chemistry specialisation, following the reform) show an abrupt drop, after 1991, in the proportion of stu-

(§) The STAPS (physical education and sports sciences and techniques) are the only notable exception to the general downward trend in university numbers. Since entrance selection based on sporting performance criteria was abolished in the early 1990s, this discipline has continued to grow apace.



Trends in flows entering the first cycle of various university subjects (France)

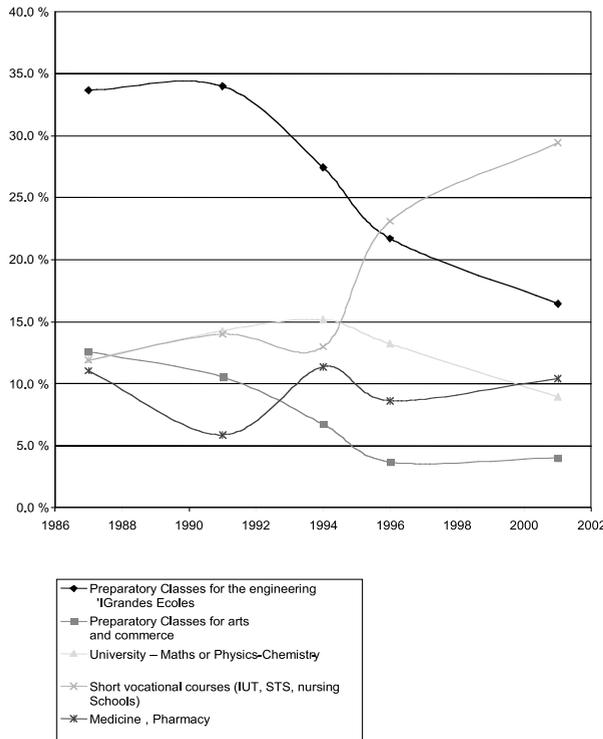
Graph 2



Source: Lixi et al, 2001.

Percentage trends in the various education options based on the educational intentions of pupils in final year C (1987-1994) and final years S, mathematics and physical sciences specialisations (1995-2001) (Académie of Lille)

Graph 3



(6) We divided numbers in these final years into eight types by cross-referencing, in pairs, the variables of 'gender', 'age at baccalaureate' and 'social background', each having two modes.

students applying for the CPGEs in comparison with the proportions applying for the short vocational options.

Through an apparent paradox this decline has led, as a result of the 'communicating vases' phenomenon discussed above, to a deficit not in CPGE admissions themselves but in the first cycles of science universities and has exacerbated the effects described above.

Does this decline in intentions show, more than the actual decline in initial university cycles, a loss of interest in science studies? Here again, a more detailed analysis advises caution. It shows that in practice it is less the natural attraction of good pupils to the preparatory classes that has changed than the composition of the final science classes. The democratisation of lycées has had an effect even in the most elitist stream, i.e. stream S, mathematics specialisation. Previously, final year C (mathematics and physical sciences) was the preserve of the best male students from good social backgrounds who were also the typical candidates for entry into the CPGEs. As numbers have grown, however, the composition of the science streams has changed. There are now more girls, more pupils from modest backgrounds, and more pupils who have not performed as well, in the science streams. This change in the composition of the population has had an impact on educational choices. A detailed comparison, by type of pupil, between the intentions of pupils in final year C in 1987 and pupils in final year S, mathematics specialisation, in 2001 (which are the most comparable sections in this respect) shows that the decline in intentions to apply for the CPGEs is not uniform among the different types of pupil (6).

As can be seen, the decline in educational intentions to continue to the CPGEs does not affect the core of the population in the final science years, good pupils who are children of managers. However, for pupils from modest backgrounds, even when of 'target age', the decline is substantial and very substantial for all pupils who are 'behind'. The intentions of these groups have also shifted towards vocationally-based options.

In other words, since the first half of the 1990s, the final science years have been increasingly less selective (although they continue to be the most selective of the French educational landscape). Pupils from modest backgrounds, even when of 'target age', continue to be under-selected in these streams as they are in the whole of the school sys-



Intentions of pupils in the final years of the science streams in 1987 and 2001, by gender, social background and age (Académie of Lille) **Table 5**

		Girls				Boys				Total
		Father blue- or white-collar worker or small businessman		Father manager		Father blue- or white-collar worker or small businessman		Father manager		
		Target age	Behind	Target age	Behind	Target age	Behind	Target age	Behind	
1987 Final years C ^o (No = 3 006)	Science CPGE	32 %	11 %	24 %	15 %	50 %	32 %	53 %	33 %	39 %
	Short vocational courses (IUT, STS, nursing schools)	11 %	28 %	7 %	22 %	11 %	23 %	6 %	20 %	12 %
2001 Final years S, mathematics specialisation (No = 3 235)	Science CPGE and engineering schools	20 %	4 %	28 %	2 %	36 %	7 %	53 %	14 %	29 %
	Short vocational courses (IUT, STS, nursing schools)	22 %	46 %	11 %	41 %	27 %	42 %	13 %	44 %	24 %

Example: in 1987, 24 % of girls of target age whose fathers were managers (middle or senior) chose to continue their education in a Preparatory Class for the Grandes Ecoles.

Percentage of 1999 baccalaureate pupils passing the first two years of university in two years **Table 6**

Option	Law	Economic sciences	Arts	Languages	Humanities	Sciences	Sport
Arts	33,2	40,3	61,7	48,6	53,0	21,4	37,2
Economics	36,6	46,9	64,4	48,7	59,0	34,7	43,1
Science	54,0	58,9	69,6	59,8	70,4	42,4	65,9
Technology	6,2	14,8	33,2	11,6	22,5	8,8	19,2

Source: La réussite au DEUG, 2001.

tem, which was not the case fifteen years ago. These pupils from more modest backgrounds and performing less well at school, have less educational ambition and are more cautious in their choices. This caution and lack of ambition are reflected, when they are entering higher education, by a preference for the short options, although these students may go back to university in the second cycle, if their school results so allow, and enter the many kinds of more vocationally-based options that universities have created in recent years.

It is also the differences in the social composition of the final science year specialisations which explain, as we have shown elsewhere (Convert, 2003), why physics/chemistry has been the subject hardest hit by the decline in enrolments; a perverse effect of the 1995 reform of lycées which has exacerbated the effects described above.

This leads us to the last of the causes of the crisis in enrolments in theoretical science disciplines that we need to examine: the proliferation of applied science and technology courses and the career prospects that they

open up, bringing about competition, even within universities, with traditional theoretical courses.

Theoretical science courses: difficult and 'not very profitable'

Theoretical university science courses are more 'difficult' than other university courses, in the sense that it is more difficult, all things being equal, to pass the examinations⁽⁷⁾. The following table which measures the success of students in the various university disciplines by their specialisation in secondary education, shows both that science baccalaureate holders are more successful in all disciplines than all other baccalaureate holders (they are, for instance, more successful in higher education in the arts than arts baccalaureate holders) and that they are more successful in non-science disciplines than in science disciplines.

These two apparently contradictory phenomena reflect both the higher average level of science baccalaureate holders and the particular difficulty of university science courses⁽⁸⁾. Science examinations are there-

⁽⁷⁾ According to the SOFRES survey commissioned by the Ministry of Education in December 2000, the main reason why lycée pupils were not applying for science courses was their difficulty.

⁽⁸⁾ These results are especially paradoxical as science baccalaureate holders enrolled for sciences are, on average, better pupils than science baccalaureate holders enrolled for other subjects. More of them obtained distinctions in the baccalaureate.



Indicators of the quality of the occupational integration of science graduates, by type of qualification **Table 7**
(Université des Sciences et Technologies de Lille, graduates leaving in 1994 and 1995)

	Theoretical 2nd cycle	Theoretical 2nd cycle + competition	Vocational 2nd cycle (MST, IUP, MIAGE)	DEA (theoretical 3rd cycle)	DEA + competition	DESS (vocational 3rd cycle)	Doctorate
In stable employment (permanent contract)	37 %	92 %	84 %	57 %	97 %	74 %	82 %
Unemployed	19 %	1 %	4 %	15 %	1 %	9 %	0 %
In managerial occupation	11 %	93 %	65 %	51 %	89 %	74 %	100 %
Median wage (2002 in euro)	1 248	1 508	1 652	1 589	1 620	1 732	1 897
<i>Numbers</i>	<i>439</i>	<i>762</i>	<i>98</i>	<i>105</i>	<i>71</i>	<i>505</i>	<i>185</i>

Source: Observatoire des formations et de l'insertion professionnelle (OFIP), Université des sciences et technologies de Lille.

fore particularly difficult. What is the reason for this? Our hypothesis is as follows: while the initial science cycles of universities admit only, and without exception, science baccalaureate holders, in the first cycles of the arts, humanities and law, a minority of science baccalaureate holders study alongside a majority of non-science baccalaureate holders whose level of education is, on average, lower than theirs. In the initial non-science cycles, therefore, they benefit from the match between the level of difficulty of the examinations and the average level of the students enrolled to enable a sufficient number of students to obtain a degree ⁽⁹⁾.

However, it is also within science universities that theoretical courses are facing competition from technological vocationally-based courses which are less difficult and more 'profitable'. Whereas science universities only really offered theoretical courses in the past, a whole range of vocationally-based courses, at different levels, have sprung up over the last fifteen years, into which students can now be diverted. These courses are attractive because, like the Grandes Ecoles, they have a selective admission policy and make it more or less certain that the students admitted will be able to obtain the final qualification and put it to good financial use in the labour market. Their outlets are in practice better overall than those of theoretical courses. This can be seen from the following table, which compares the objective profitability of university science qualifications applying two criteria: job security and pay.

This table shows that access to a skilled job in the public service ⁽¹⁰⁾ offering both reasonable pay and greater job security is a risky pathway. It requires success in a competition taken following a theoretical option.

In all the main cases, however, the holders of theoretical qualifications unsuccessful in this competition find it more difficult to find jobs (lower pay and less job security) than students who have taken a vocationally-based course of an equivalent level. Moreover, even for those successful in competitions, wages are lower than those of graduates of vocationally-based courses of an equivalent level. In a context of increasing proportions of students from modest backgrounds, more sensitive to guaranteed occupational prospects, the increased supply of vocationally-based courses is obviously causing, at each level, students to shift away from theoretical courses with less certain prospects towards 'profitable' courses.

Conclusions

In France, trends in the socio-demographic characteristics of the student population and in higher education supply seem to be key factors in explaining the decline in numbers in theoretical science disciplines and the increase in numbers in technology and applied science courses.

With a medium-term prospect of an increase in the number of jobs requiring long scientific and technical education (Commissariat général du plan, 2004), restricting access to most of these courses to science baccalaureate holders is a bottleneck in the French system. Improving the social and educational status of secondary technological education, often discussed but never implemented, is a potential solution to the shortfalls that are to be feared. Within higher education itself, there needs to be a change in attitudes so that those possessing a genuine technological education can gain access to the same types of knowledge as those possessing a more theoretical education.

⁽⁹⁾ Ministerial statistics show that, despite demographic fluctuations, the rate of entry into the second cycle of baccalaureate holders enrolled for the first year at university has remained constant since the early 1990s.

⁽¹⁰⁾ In the case of science graduates, these are chiefly occupations in primary, secondary and higher education and research.



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Annex: Brief description of French higher education

Pupils passing the baccalaureate who wish to continue on to higher education (see below for rates of higher education take-up by type of baccalaureate) can choose between universities and courses with selective admission.

Universities

Universities are open in France to all baccalaureate holders and have no entry selection. Since 2004/2005, education has been organised on the Degree-Masters-Doctorate model. During the Degree or Masters, students may enter vocationally-based streams either within universities themselves (vocational degrees, diplomas of university vocational institutes, vocational masters) or outside in engineering schools.

Prior to European harmonisation, the first cycle lasted two years and led to a Diplôme d'Études Universitaires Générales (DEUG – Diploma in General University Studies), the second cycle lasted a further two years (Degree and Masters) and the third cycle included two strands, one vocational, lasting a year and leading to a Diplôme d'Études Supérieures Spécialisées (DESS – Diploma in Specialist Higher Education), and the other theoretical starting with a one-year taught

course leading to a Diplôme d'Études Approfondies (DEA – Diploma in Advanced Studies), and continuing with the preparation of a doctoral thesis.

Courses with entry selection

□ **The Classes Préparatoires aux Grandes Écoles (CPGEs – Preparatory Classes for the Grandes Écoles)** These are taught in lycées. They last two years and prepare students to sit the entry competitions of the Grandes Écoles. The Grandes Écoles are in particular schools of engineering and schools of commerce, but also include the École Normale Supérieure, which is a nursery for high-level researchers. Courses at the Grandes Écoles normally last three years.

□ **The Instituts Universitaires de Technologie (IUTs – University Technology Institutes)** These Institutes are run by universities and have special status. They award the Diplôme Universitaire de Technologie (DUT – University Technology Diploma) following two-year courses after which students may enter working life or (much more frequently) continue their education in universities or other higher education schools.

Key words

Higher education, pure sciences, applied sciences, choice of studies, number of students, access to employment.



Baccalaureate stream	General ⁽¹⁾	Technology ⁽²⁾	Vocational
Baccalaureate passes in 2003	268 335	142 799	91 537
Percentage continuing education:			
at university	62 %	18 %	6 %
in CPGEs and engineering schools (3)	10 %	1 %	0 %
in IUTs	11 %	10 %	1 %
in STSs	10 %	45 %	14 %
in nursing and allied schools (4)	4 %	5 %	0 %
in other schools	3 %	1 %	1 %
Total (5)	99 %	81 %	22 %

(¹) The general baccalaureate has three streams: arts (51 893), economics and social sciences (81 068), sciences (135 374).
(²) Including 35 271 in the industrial sciences and technologies section, 5 794 in the laboratory sciences and technologies section, 17 836 in the medical and social section and 76 098 in the service sciences and technologies section.
(³) Small number of engineering schools which can be entered directly after the baccalaureate (five-year courses).
(⁴) Evaluation from 2001/2002 data.
(⁵) Evaluation.

□ **The Sections de Techniciens Supérieures (STSs – Higher Technicians’ Sections)** Teaching is provided in lycées. Courses last two years and lead to a Brevet de Technicien Supérieur (BTS – Higher Technicians’ Certificate) following which students can enter working life as skilled workers or (in a minority of cases) continue their education in universities or other higher education schools.

□ **Nursing and allied schools** These schools are for the most part run by the Ministry of Health.

Allied schools include other paramedical schools (opticians, physiotherapists, speech therapists) and schools for social workers. Courses last three years in most cases and lead to a vocational diploma.

□ **Other schools** There are also schools for engineering, commerce and accountancy which can be entered directly after the baccalaureate. The higher schools of arts, especially architecture schools, are included in this group.



The situation in industry and the loss of interest in science education



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Introduction

In the midst of the economic stagnation of the early 2000s, engineers and scientists are becoming scarcer in Germany. Technological research centres are bewailing the failure of large firms to recruit young scientists. Recruiting engineers is proving to be a serious problem for some 40 % of industrial enterprises (Zwick and Boockmann, 2004). Experiences in the Hamburg aircraft building area show the extent of the problem: relying on the attractiveness of these jobs, the players in this area felt that they were protected against a shortage of technical experts. Ultimately, however, they had to turn to the Swedish labour market to find the two hundred engineers they had tried in vain to recruit in Germany.

The market shortage reflects a drop in the number of young science and engineering graduates. Between 1996 and 2002, annual outflows fell from 53 000 to 36 000 in engineering and fell by as much as 50 % in conventional science disciplines such as physics and chemistry. This downturn has been caused by a major loss of interest in these subjects starting in the early 1990s. Our article analyses and interprets the reasons for this trend.

Section 1 examines the quantitative aspects of this process. To explain these changes, reference is made primarily to the cobweb cycle model. This model is examined in Section 2. A number of prior structural conditions are needed if the cobweb cycle is to emerge and continue. Two conditions are discussed in Section 3: the ability of higher

education to adapt to changes in flows and the segmentation of the labour market into occupational compartments.

Trend, change or cycle?

Has there been a loss of interest in higher education in the sciences in Germany? Analysis of various quantitative parameters shows that the answer depends on the index used. It is possible to show an increase, a stagnation and a decline in interest in these disciplines. According to Graph 1, for instance, which shows first-year enrolments in absolute figures, enrolments in these disciplines have increased in the long term ⁽¹⁾. The data for other parameters tend nevertheless to show a stagnation or a downward trend; in the long term, the proportion of new enrolments in science education among the corresponding generation of upper secondary leavers has been stagnating; the proportion of all new enrolments for which enrolments in science education account has been declining ⁽²⁾.

Graph 1 nevertheless shows that these processes are highly cyclical. This is also true of the other two chronological series. In the rest of this article, we will focus on the most recent cycle, starting in the 1990s.

A more detailed analysis of the statistics for this period shows major contrasts in trends in different disciplines (see Graph 2) ⁽³⁾. Three types of trend can be discerned:

□ the first is typical of the traditional physical (chemistry and physics) and engineering (mechanical, electrical) specialisations ⁽⁴⁾.

The case of Germany is taken as an example of cyclical variation in higher education enrolment in the sciences. This article looks at the causes of this 'oscillation', focusing on the cycle of the 1990s and argues that the mechanism underpinning these fluctuations is the cobweb model. This model establishes a recursive loop between trends in enrolments in a discipline and trends in the labour market associated with this discipline. The analysis highlights two conditions that are required for the model to apply: the elasticity of higher education capacity and the segmentation of the labour market.

⁽¹⁾ Enrolments for the short and long options (respectively the Fachhochschule and university) have been aggregated. This amalgamation is justified by the very synchronous trends in these enrolments. From 1993, the figures relate to re-unified Germany.

⁽²⁾ As a proportion of all enrolments, new enrolments in science education fell by an average of 0.22 points per annum between 1975 and 2000. For reasons of space, these statistics are not included here. They can be obtained from the author.

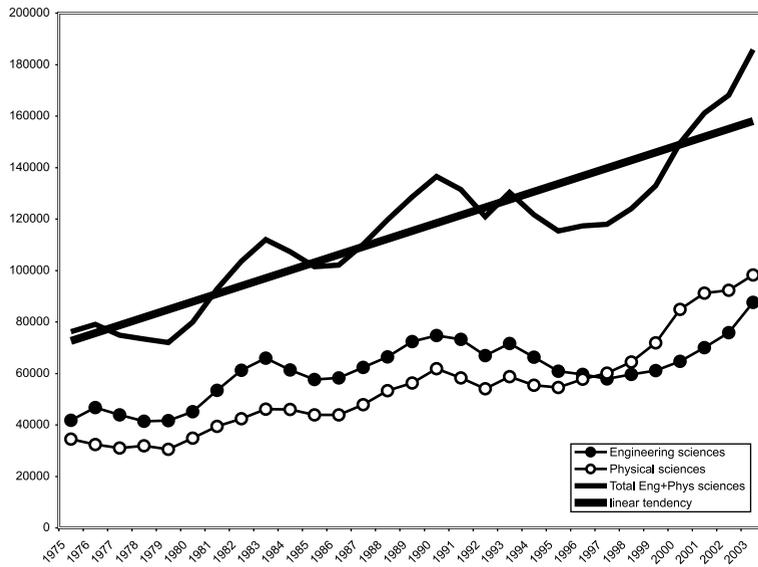
⁽³⁾ Field: re-unified Germany. Fachhochschule and university enrolments have been added together.

⁽⁴⁾ Including electronics.



Trend in enrolments in science education

Graph 1



Source: Statistisches Bundesamt

ent again. Enrolments have grown fairly stably in these subjects.

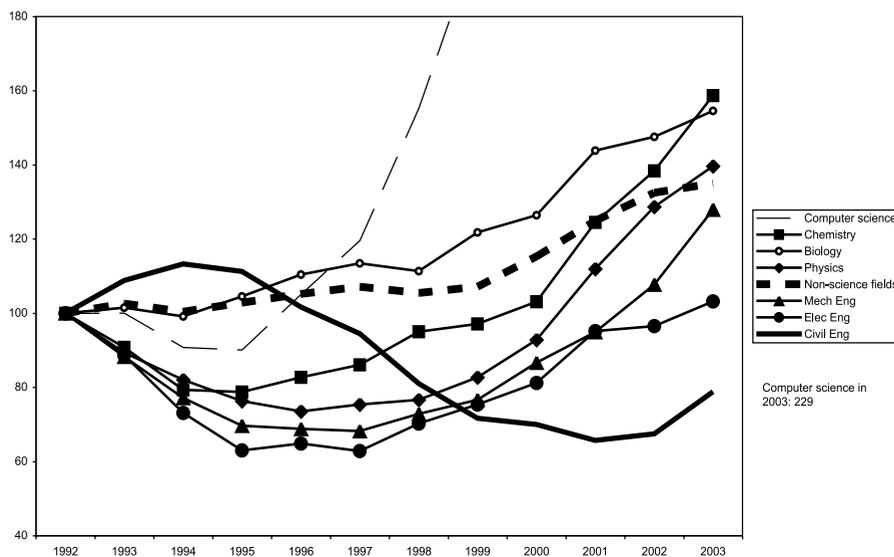
These statistical observations lead us to make two comments: first, the loss of interest in science education has to be explained in terms of cycles and not in terms of trends or changes. Second, the different trends in different specialisations are worth interpreting.

Fluctuations in enrolments in higher science education in Germany: an approach based on cycles

The 'cobweb model' is often used to interpret fluctuations of the first type discussed above (Bargel and Ramm 1999; Minks et al, 1998; Neugart and Tuinstra, 2003; Zwick and Boockmann, 2004). Reference is generally made in this respect to the classic works of Freeman (1975, 1976a, 1976b) on variations in enrolments in higher science education in the USA.

Trend in enrolments by specialisation (index 1992=100)

Graph 2



Sources: KMK (2003); Statistisches Bundesamt

The cobweb model establishes a recursive loop between the trend in enrolments in a discipline and the trends in the labour market associated with this discipline. The following diagram illustrates the phases and intervals making up this process.

Taking, for instance, the situation T1 of Graph 3 as an example, the process starts at that time with a massive upturn in the number of enrolments in the discipline in question. The state of the labour market explains this upturn: it is brought about by an improvement in conditions in the job market in question.

From time T2 there is a reversal in the trend in enrolments, leading to a sharp decline. This change is primarily explained by the fact that market conditions have become much worse. The intrinsic factor in the model is the massive influx of young graduates from the preceding period (phase T1 to T2). An external factor, such as the shock of an economic recession, may also play a part in worsening allocation. Young people at the guidance stage, alerted to the moribund state of the job market, react by losing interest in the corresponding discipline.

However, from time T3 the decline is replaced by an increase in enrolments. This new growth is due to the fact that market conditions have again improved. The improvement factor intrinsic in the model is the

These four subjects have experienced the same rhythm of heightened decline and revival of enrolments. It is largely the fluctuation in these specialisations which has provided the sciences overall with a cyclical movement;

- the trend in civil engineering is different; its enrolment cycle runs directly counter to the first cycle discussed above;
- the trend in non-science disciplines and in computer science and biology is different;



progressive shortage of young graduates; this is a result of the loss of interest among the previous generations (phase T2 to T3). Subsequently, the arrival in the market of the generation of increased enrolments bears the seeds of a renewal of the cycle.

In comparison with the enrolment curve, the graduate series is flatter and offset downwards, reflecting the fact that some of the students enrolled leave during courses. These early departures may be due to dropping out or transfers to other disciplines.

Graph 3 shows the trend in inflows and outflows for the four disciplines of the first type discussed above. The phase shift characteristic of the cobweb model is fairly clear-cut from the 1990s^(*). According to the analysts using this model, the cycle emerged not so much because the wave of enrolments during the 1980s arrived in the labour market, but primarily because of the acute industrial recession in the early 1990s. The labour market for the four occupations considered here experienced a drop in demand, as the main industrial enterprises froze any recruitment of young engineers or researchers for a number of years and made experienced technical managers redundant for the first time. This made it very difficult for physical science and technology graduates to find jobs (Parmentier et al, 1998a, 1998b). It is this far-reaching crisis in industry-related job markets that explains the decline in enrolments in the associated disciplines.

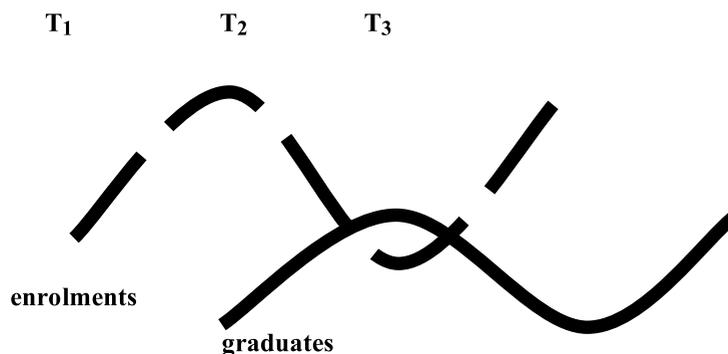
The decline in enrolments up to the second half of the 1990s is now being reflected by an extremely small number of young graduates. As a result, industrial enterprises are complaining about the shortage of engineers and scientists. In keeping with the model, new enrolments have since soared.

The picture shown by Graph 3 has been supplemented by official forecasts of the annual number of new graduates up to 2009 (KMK, 2003). According to these estimates, this number will increase sharply during this period - a result of the sustained and recent upturn in enrolments. The market situation, which is currently very advantageous for graduates in the four disciplines examined, is likely to deteriorate when the current wave of new enrolments comes on to the market.

An interpretation based on the interaction between the job market and enrolments is

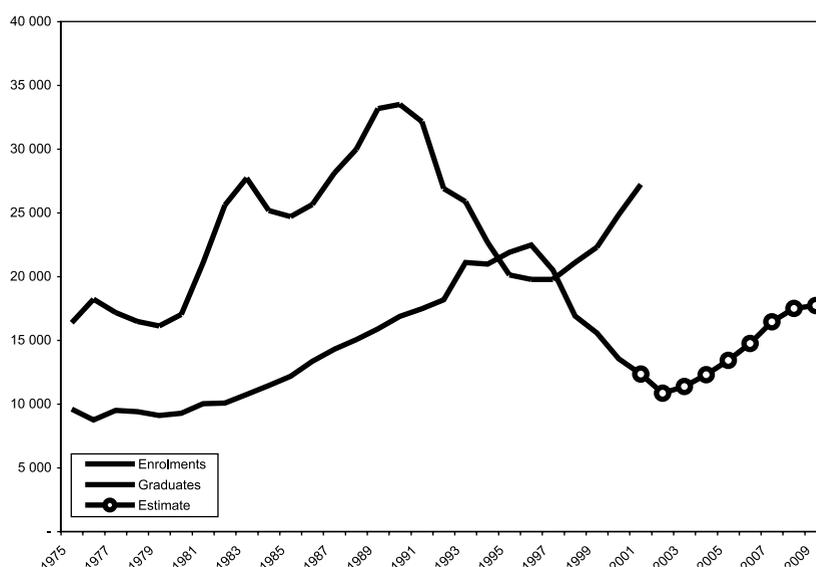
phases and intervals making up the cobweb cycle

Graph 3



Trend in enrolments and graduation in four science disciplines

Graph 4



Sources: KMK (2003); Statistisches Bundesamt

borne out by the situation in civil engineering. This discipline shows the same cycle in reverse (see Graph 2), reflecting the specific situation in the construction industry. Activity in this sector did not mirror other industries because of the rebuilding of East German infrastructure. In the late 1980s, activity in this sector increased sharply before falling back into recession from 1995. This particular rhythm has been reflected by a cobweb cycle of enrolments in civil engineering which is not in phase with the cycle for the four disciplines of the first type.

Institutional conditions for cyclical adjustment

A comparison of the countries of Europe shows that the labour market problems faced by physical and technological science grad-

(*) Between 30 and 50 % of students drop out of courses in the four specialisations examined here. Analysis of motivations shows that these early departures are not primarily due to the labour market: the difficulty of the subjects taught seems to be the main reason why students drop out at an early stage (Heublein et al, 2002).



uates do not necessarily lead to a fluctuation in enrolments (International Working Group, 2003). Moreover, a comparison of the various higher education fields in Germany shows that enrolments are not correlated with the labour market in many specialisations (Briedis and Minks, 2004) ⁽⁶⁾. These observations highlight the fact that the operation of the cobweb model depends on a number of specific conditions. Heijke (1996, p. 9) lists the three aspects conventionally put forward:

'In the first place, there must be a clearly defined sub-market for people with a particular kind of training. The second condition is that the training lasts relatively long. (...) The last important condition is that people who are choosing a course of study respond to the labour market situation at that time, rather than to the prospects as they will be when they have completed the course'.

In this section, we shall look in detail at two factors. The first is the elasticity of the education system - how well it adapts to fluctuations - a factor not included in the quotation. We are therefore introducing a new aspect which is not really dealt with in the literature. The second is the segmentation of the labour market, listed in the above quotation, which we will examine in detail for the occupations of engineer and scientist.

The condition which we have called 'elasticity of education system capacity' means that the infrastructure of a higher education discipline (departments, numbers of teachers, etc.) is maintained during slack periods and tolerates the overload during peak periods. The alternatives to elasticity are reduction by selection and, taking a market approach, the play of expansion/contraction.

Elasticity as a management method is very characteristic of German science and technology disciplines. During the slack period of the 1990s, it was very rare for physical science or engineering departments to be closed down or merged. In some places with good reputations for science education, such as the faculties at Karlsruhe and Darmstadt, enrolments fell by 70 % but they managed to survive without taking much infrastructure out of commission. The same elasticity can be seen during peak periods, in the form of overload practices. In 1991, for instance, the record year for science enrolments in engineering courses, German

federal education statistics show that 350 000 students enrolled for this discipline (all years combined) and shared the 150 000 places formally allocated to the institutions concerned (Statistisches Bundesamt, 2000).

The reasons for this elasticity depend on the trend in enrolment flows. From the point of view of infrastructure, it is obviously advantageous to try to retain the particularly large-scale technical equipment used in these fields during periods of educational recession. At the same time, the importance of this infrastructure for innovative and/or regional economic circles has been widely politically recognised. Works on industrial basins have in particular reiterated the view that the comparative advantage of many German industries lies in the traditionally very intensive relations between science and technology faculties and enterprises (OECD, 1999).

Overload is reflected by a firm tendency to cap infrastructure despite the expanding number of enrolments. Practice bears witness to a culture of free access. At the same time, it reflects the well-established political interest, shared by employers, in safeguarding a balance between vocational training and higher education. Any major higher education programme may well divert student flows and thus destabilise the status of vocational training. Access to intermediate occupations offers a particular illustration of this scenario. In Germany, vocational training is the almost exclusive nursery for these occupations. This primacy undoubtedly helps to keep vocational training attractive. A rapid and substantial expansion of higher education could well destabilise this arrangement, chiefly because of the competitive pressures that higher education graduates would exert on access to these intermediate occupations. The function of overload policy in higher education can therefore be seen as a kind of deterrent - curbing any expansion of education in order to protect the status of vocational training.

As Heijke, cited above, points out, the job market is another condition preceding a cyclical development of enrolments. A key factor in the job market is the major correspondence between the profile of graduates in a discipline (skills, career plans) and employers' preferences. According to the 'institutionalist' labour market approach (Baden et al, 1996), this mutual affinity has become root-

⁽⁶⁾ Biology, which is growing (see Graph 2), is among the disciplines which have evidently not been affected by chronic labour market problems. As far as we know, no research offers a solid interpretation of this phenomenon. A promising avenue for exploration may well be the fact that the upturn in enrolments in biology during this period has been due exclusively to women who accounted for as much as two thirds of new enrolments in 2003.



Proportion and number of graduates entering the service sector by scientific discipline and year of graduation

Table 1

Discipline	% of graduates entering the service sector (first job)		Number of graduates entering the service sector (first job)		
	Year of graduation 1989	Year of graduation 1997	Year of graduation 1989	Year of graduation 1997	Trend 1989 - 1997
Electrical engineering	11	24	1200	2800	+ 1600
Computer science	12	55	400	3600	+ 3200
Physics	6	23	200	800	+ 600

Field: commercial services excluding research and training work
NB: the figures are for Fachhochschule and university combined.
Example: among computer science graduates in 1989, 12 % (= 400 people) found their first job in the services sector. This percentage increased to 55 % (= 3 600 people) for computer scientists graduating in 1997.
Source: Briedis and Minks (2004), personal calculations

ed because it offers advantages, for both sides, in terms of certainty and of integration and adaptation. As a result, graduates very rarely experience substitution in the market segment associated with their discipline. When professionals are lacking, attracting a labour force from other disciplines or markets is an atypical move which is generally expensive, risky and therefore not very efficient. At the same time, it is very difficult for the occupation to infiltrate other job markets; in a situation of surplus, it adapts only with very great difficulty, through the exodus of surplus workers. In short, a system segmented into job markets entails inflexibility which curbs inter-sectoral mobility.

A first example of Germany's segmented structure is to be found in the ability of young graduates from three 'neighbouring' disciplines to get round the problems of gaining a foothold in the industrial sector by shifting into the booming commercial services sector. The three disciplines considered here are computer science, electrical engineering and physics (?). All three have a strong information technology component. These technologies are spreading, as we know, through all sectors, including services.

The following table shows that the services sector has been moderately infiltrated by electrical engineering and physics graduates but has been massively infiltrated by computer science graduates.

This contrast is due to the relationship between training and the specific market. Computer science prepares for ubiquitous jobs; the ubiquity of outlets is also a feature of law and economics. The fact that 'transverse' disciplines such as computer science do not follow a cobweb model (see Graph 2) is explained by the wide range of outlets that they offer for their graduates. The other two

specialisations are much more subject to segmented market restrictions. Physics trains 'generalists' who are channelled towards and of interest to industrial or public research but are fairly remote from the needs of small service enterprises; these prefer specialists who can be put to work straightaway (Fuchs, 2004). Electrical engineering is linked, in terms of training and attitudes, to jobs which call for the joint mobilisation of the two competences of 'IT' and 'electrical/electronic equipment' (ZAV, 2002). This type of job is fairly rare in the services sector.

A second example of market segmentation is provided by careers in engineering. There is a popular expression in Germany according to which this group has 'funnel careers' (Schornsteinkarrieren). This revealing expression relates to the promotional streams within and between enterprises which are both well marked out vertically and very narrow horizontally. Comparative international research into engineers has shown that this kind of career predominates in Germany (Faust 2002; Lawrence, 1992) - and that a double qualification is persisting, which is very different from the case in France and the United Kingdom. In practice, engineers do not swap their technical responsibilities for managerial responsibilities during their careers, as may be the case in France and the United Kingdom. In Germany, organisational systems require them to develop both competences. A result - whether intentional or not - of this arrangement is that it is almost impossible for technical managers to become pure managers eligible for and interested by a wider range of operational and economic sectors.

The two institutional conditions examined here, the elasticity of the education system's capacity and the segmentation of the job market, combine to cause any adjustment

(?) Industry is traditionally a main outlet for these three disciplines. Among electrical engineering graduates in 1989, 75 % found their first job in an industrial sector. This percentage was 66 % for computer scientists and 30 % for physicists graduating in the same year (Briedis and Minks, 2004).



to be transferred: the characteristics of the job market curb inter-sectoral mobility, thus transferring the supply/demand adjustment pressure to enrolments in the corresponding higher education courses. Without quotas, this transfer is reflected by cycles in enrolments. These cycles bring about subsequent mismatches generating or continuing the cobweb process.

Conclusion

The loss of interest in higher education in the sciences is, in Germany, part and parcel of a cyclical process of enrolments in the disciplines in question. The process is not compatible with the image of a medium- or long-term trend or with the image of a recent change. It is much more in line with the cobweb model in which there is a cyclical alternation of interest and loss of interest in this area of education.

The cobweb system is based on a recursive loop; the labour market imbalance directly causes changes in enrolments which, in turn, lead to new imbalances. A number of conditions are needed for these imbalances to occur. Without being exhaustive, these include the ability of the education system

to modulate its reception capacity, the length of training and the segmentation of the labour market into occupational sectors.

The model implies that it is these labour market processes, rather than demographic or cultural changes or changes in the education system, which determine the rhythm of enrolments in these subjects. This hypothesis is consistent with the judgment of a number of contemporary observers. According to Lewin (1999), Wolter (1999) and Zwick and Renn (2000), the social institutions are gradually losing the ability to ensure that people prepare for specific career plans. Among other things this is due to the increasing proportion of secondary school leavers who play a waiting game or are undecided about their choice of pathway and education. The rift brought about by this 'under-socialisation' is helping practices based on calculations of immediate commercial value to gain ground. According to Lutz (2001), the proportion of young people whose behaviour mirrors the neoclassical models of human capital investment is set to increase sharply. The cyclical alternation of interest and loss of interest in the sciences is therefore a spectacular manifestation of the advance of a utilitarian attitude towards choices of education.

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Efforts aimed at solving the enormous shortage of higher education graduates in science and technology in the Netherlands should start by evaluating what is available in this area. Research shows that the country's vast resources include considerable reserves of science and technology talent. These reserves comprise students who, although having met the entry requirements, ultimately did not opt for a technical or science study programme. Several measures could mobilise these reserves; some are presented in this article along with the influence they are estimated to have. Although

Opting for Science and Technology!

Introduction

From an international perspective, the Dutch economy is struggling with sluggish growth in productivity. In its policy recommendation *Towards a plan for productivity in the Dutch production industry* the Foundation for Industrial Policy and Communication (SIC, 2003) points out that the low level of expenditure on research and development (R&D) is one of the causes. Research further indicates that the effectiveness of technology grants provided to stimulate R&D would be greater with a larger supply of knowledge workers with a science/technology (sci/tech in short) background. Not only are more technicians needed, the technological changes notably require technicians also to be more highly educated. This is particularly so if the Netherlands wants to reach its goal of becoming one of the leaders of the European knowledge-based economy.

The Netherlands is not alone, though, in wanting to increase the science and technology content of the working population. On 5 May 2003, the European ministers of education issued a joint declaration in Brussels to the effect that more science and technology students will be needed to maintain the required level of the knowledge-based economy (Education Council, 2003). The Council wants to increase the number of relevant students by 15 % between now and 2010, while giving appropriate attention to improving the man/woman ratio. The communiqué does not indicate, however, exactly how this increase is to be realised.

The problem of shortages in science and technology has not arisen overnight. In November 1992, The Economist reported that: '... universities continue to churn out humanities-trained generalists at a time of soaring demand for scientists and engineers'. In the Netherlands over the past 10 years, the alarm has been sounding over the problem of the (insufficient) influx into science/technology. In 2003, industry was still complaining about (threatening) shortages of technically trained personnel. At the same time, universities feared underutilisation and

the eventual abolition of courses in science and technology. With the prospect of the dramatic outflow of university staff reaching pensionable age in the coming years, this development is cause for alarm.

Certain actions were taken in addition to sounding the alarm. For example, more than 10 years ago, the government conducted the not very successful campaign *Kies Exact* (Choose Science). Recently the system of secondary professional education was restructured with a view to stimulating the number of students choosing science/technology, though its success is controversial. The government and employers have jointly carried out a large number of projects aimed at promoting science/technology in education, and with the implied need to engage seriously in full implementation of the best practices found. Following the Confederation of Netherlands Industry and Employers VNO-NCW, the government has started a Delta Plan for science and technology, and funds are available for this purpose.

In this article, we will be seeking an answer to the question: 'How much sci/tech talent is actually available in the Netherlands?' That not all talent will opt for a technical education should be considered obvious. After showing the extent of talent available, the question is how this talent can be induced to opt for technology. The work is based on data from different databases (see Annex 1).

Definitions

In the Netherlands the system of higher education is split between professional higher education (PHE) and academic higher education (AHE). The latter is generally more theoretical and considered superior. Pupils from pre-university secondary education (VWO) can, after graduation, choose between PHE and AHE. In contrast, pupils with a diploma from intermediate vocational education (MBO) or senior general education (HAVO) can only enrol in PHE. In Annex II the Dutch education system is described in more detail.



Talent

Before being able to deal with the question of whether there is sci/tech talent in the Netherlands, we first need to define the concept of sci/tech talent. It takes little effort to agree the designation 'talent' in this context. When, in this paper, reference is made to sci/tech talent, this means that the pupil who goes to secondary school studies (or, for students, has studied) the right range of subjects to be admitted to studies in science or technology. This may conceivably be linked to a quality requirement: for example, the condition that the final marks obtained for these subjects meet at least a certain minimum.

Prior to introducing optional subject clusters in secondary education, the requirement for admission to studies in science or technology used to be at least mathematics and physics among the subjects chosen. Research into files of first-year students of the 1991 cohort showed that, in addition to the number of sci/tech subjects, the average final examination mark increases the chance of obtaining the first-year certificate of a study in science or technology (de Jong et al., 1998).

The most recent students entering higher education had not chosen any specific subjects in secondary education, as they would have under the old system, but rather a particular subject cluster. The first of two decision points which could lead to education in science/technology, coincides with the moment pupils must choose a subject cluster in secondary school. The second is choosing the particular study option. So, in addition to delineating talent among students in higher education, we can also distinguish sci/tech potential among pupils in secondary education. To this effect, we select pupils with the optional nature and technology or nature and health subject cluster.

Reserves

To gain a proper picture of the science and/or technology potential available in the Netherlands, we also look at the group of pupils/students who, although meeting the admission requirements, do not choose to pursue a technical education or studies in science. When such talent decides not to engage in studies in science/technology, they are allocated to the so-called sci/tech

reserves. In this article, sci/tech studies are understood to refer to courses in the nature and technology sectors, and laboratory courses at universities of professional education. According to this definition, courses in the agriculture and health sectors are not counted among the sci/tech studies.

Are there actually reserves of sci/tech talent?

In the second half of the 1990s, it was shown in various ways that there are large reserves of sci/tech talent in the Netherlands ⁽¹⁾. The actual volume depends on the definition used for sci/tech talent, for which a distinction can be made between pupils and students.

Pupils in secondary education

In their third year, pupils in the Netherlands must choose one of four subject clusters ⁽²⁾:

- nature and technology (N&T)
- nature and health (N&H)
- economics and society (E&M)
- culture and society (C&M)

The central idea behind this classification is to make pupils reflect at a rather young age on the direction in which they want to be further educated. To generate sufficient influx into technical studies, a requisite number of pupils will have to opt for the preparatory nature and technology subject cluster.

In the Netherlands, sci/tech talent is certainly adequately available, but in many cases the choice of a non-technical education is made on economically rational grounds. The influx into the nature and technology subject cluster steadily declined during the 1990s, but has stabilised in recent years (Figure 1). At the same time, the nature and health subject cluster clearly gained in popularity. So, we observe a shift towards 'more-human-oriented' technology. An experiment called 'Human Technology' successfully conducted at the Hanze PHE Institute demonstrates that students transferring from the non-nature and technology subject clusters can successfully complete studies in technology in PHE.

When looking at secondary-school pupil decision-making on the subject cluster to be taken, it turns out that the choice is partic-

the effect of these measures seems to be substantial, they leave much to be desired in terms of cost-effectiveness. Moreover, they are still simulations, and the measures have not (yet) been tested in practice. Therefore, additional (experimental) research on such policy measures continues to be desirable.

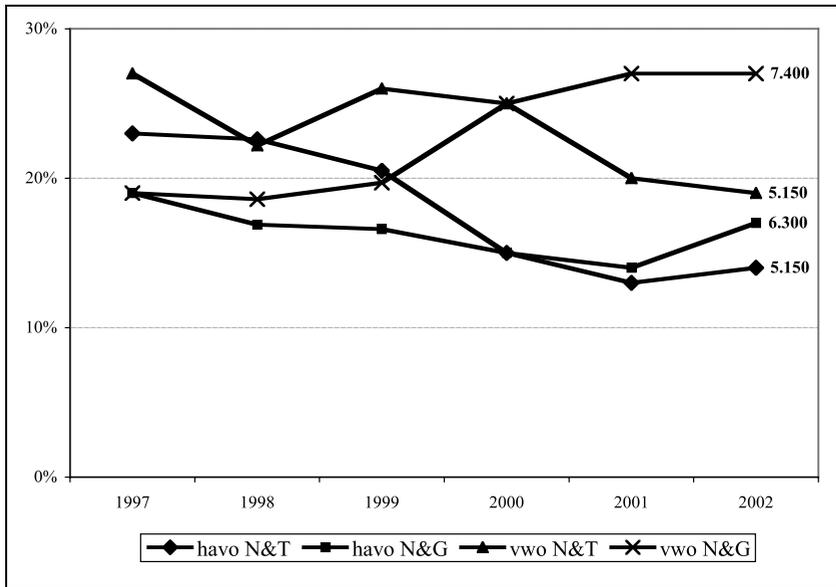
⁽¹⁾ Hop et al., (1999); Roeleveld (1999); Bloemen and Dellaert (2000); De Jong et al. (2001).

⁽²⁾ The main inflow in higher education in the Netherlands runs through 5-year general secondary education (HAVO) and 6-year pre-university education (VWO).



Opting for nature subject clusters*

Figure 1



* additionally shown are the number of students in the final exam class of 2002, per level and profile (total number of final exam students in 2002: HAVO 37 thousands and VWO 27 thousand).

Source: SEO / Aromedia (SCM, 1997-2002)

comparison between pupils who have chosen this subject cluster and the other pupils, it is possible to give an initial outline.

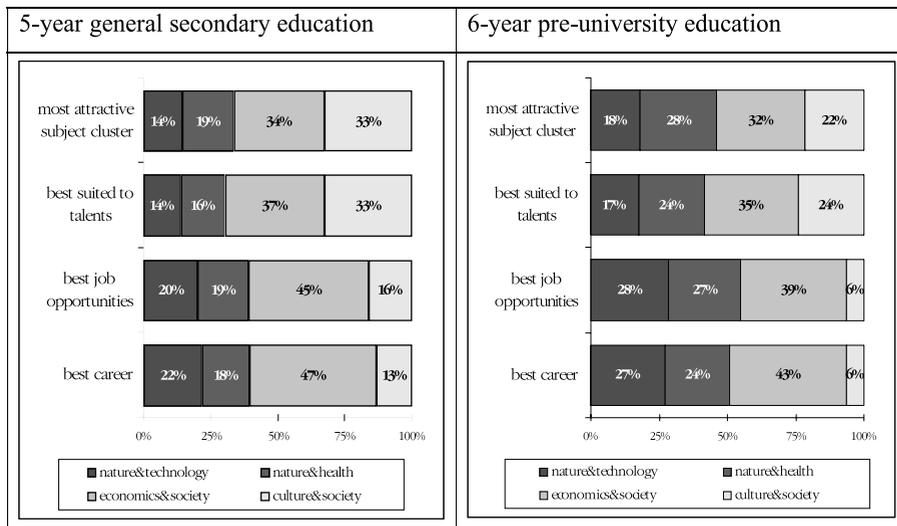
While several factors influence the choice of a specific subject cluster, it is interesting that the relative weight of these factors hardly differs when comparing the different subject clusters (Figure 2). Among pupils in five-year general secondary education who had chosen the nature and technology or nature and health subject cluster, one consideration, often mentioned for making such choice, was that it would benefit their careers. At the six-year pre-university education level, a similar relationship can be observed while it is to be noted that the emphasis is on the quality of job opportunities.

Students

The extent of hidden science and technology talent among first-year students in 1995 and 1997 has been calculated on the basis of data from the DHO research project (See Annex 1). The fact that the aptitude of students and pupils for science/technology does not change from one year to the next gives this analysis the proper relevance. The results are shown in Table 1. This relates to the national totals in non-sci/tech studies with at least mathematics and physics in their subject packages and an average final examination mark for science subjects of seven or higher. Based on the processed sampling data from the 1995 cohort and the 1997 cohort it can be concluded that there is a large amount of hidden sci/tech talent available in higher education. To simplify somewhat the interpretation of this data, it is worthwhile to know that in 1997 there were 12 900 sci/tech students at the level of PHE and 7 000 at the level of AHE.

Relative weight of specific considerations in choosing a subject cluster/subject package in 2001

Figure 2



Source: SEO/Aromedia (2002)

ularly influenced by interest, the possibility for self-fulfilment and the prospect of a paid job. In addition, aspects such as background characteristics of the pupils, level of education of their parents, and performance at school also play a part.

Why pupils opt for the nature and technology subject cluster, is the proverbial sixty-four thousand dollar question. Using a

The above figures show that the number of women that may be characterised as hidden sci/tech talent is not particularly large compared with men. Although the proportion of hidden talent for women is indeed larger, the group that may be included in sci/tech talent, based on the choice of mathematics and physics and the relative marks obtained, is much smaller than for men.

Figure 3 shows the sectors where a substantial portion of science and technology talent (having mathematics and physics in their subject packages with at least a seven for science subjects) was to be found



among first-year students of the 1997/98 cohort.

In PHE, these students are found mostly in the economics sector and, to a lesser extent, in education and agriculture. In AHE, the portion of sci/tech talent is highest in health and economics and, to a lesser extent, in the social sector. In the other sectors of both PHE and AHE the portion of sci/tech talent is less than 10 %.

Following the introduction of the renewed second phase in secondary education and the requirement to choose one of the compulsory subject clusters, the situation has changed extensively. For this reason we are using data from the sci/tech reserves in AHE for the academic year 2002-03 provided by the Office of Institutional Research of the University of Amsterdam (UvA). The extent of the reserves of sci/tech talent has been calculated - based on the 2002 December 1 counts - for the total of AHE and for most universities individually (see Table 2).

Judging by the more than 8 000 students with a nature and technology or nature and health subject cluster in pre-university education, there are reserves of 23 %, approximately 1 800. They are largest at Erasmus, UvA and Maastricht and smallest at the VU.

It is not possible to make an accurate comparison with the former situation because the nature and health subject cluster is intended for both science and technology courses and courses in the health and agriculture sectors. In the former situation, a large portion of the reserves of approximately 3 450 students in higher education opted for one of these two sectors. So, it seems the reserves have not diminished after the introduction of the subject clusters.

Inducements for studies in science and technology

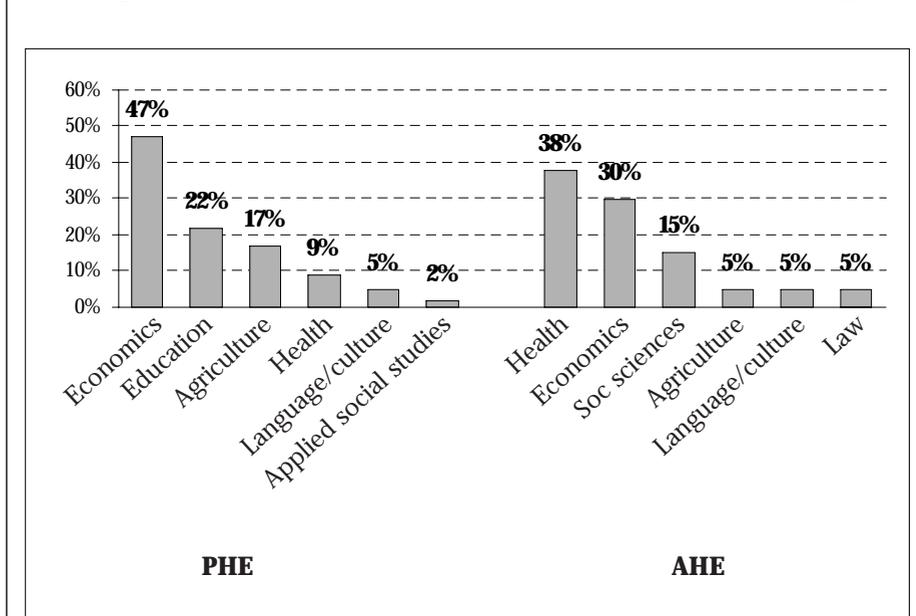
If the minister wants to take real action on the objectives as formulated in Brussels, the sci/tech reserves of the Netherlands will have to be addressed. How can the decision-making process of a group of students - potentially successful in science or technology but opting for other studies - be influenced? Are there any conceivable measures that can 'tempt' this group into choosing a technical or scientific education? Such 'steering' of the choice of study can, in prin-

Hidden sci/tech talent quantified **Table 1**

	1995 cohort			1997 cohort		
	man	woman	total	man	woman	total
AHE students	1 150	1 050	2 200	1 900	1 550	3 450
PHE students	3 000	450	3 450	3 800	700	4 500

Source: de Jong, et al. (2001), p. 66

Percentage of sci/tech talent in sectors of PHE and AHE **Figure 3**



Source: de Jong, et al. (2001)

Overview of science and technology reserves in the total of AHE (by institution) **Table 2**

Pre-university education nature/health/technology subject cluster	Science/technology reserves
Erasmus University (Erasmus)	58 %
State University at Groningen (RUG)	38 %
Maastricht University (U Maastricht)	35 %
University of Amsterdam (UvA)	35 %
Catholic University Nijmegen (KUN)	31 %
Leiden University (U Leiden)	31 %
Utrecht University (U Utrecht)	27 %
Free University (VU)	21 %
Total Netherlands Academic Higher Education	23 %

Source: CBS, 2002 Dec. 1 count; Office of Institutional Research, University of Amsterdam

... can be achieved through various direct and indirect stimuli.

Indirect methods relate to the perception students have about the course of their studies and what will be the added value of such studies. In this context one could think, for instance, of how students estimate their chances of obtaining a diploma and what



Expectations from their own studies as compared with studies in sci/tech of students in AHE with a nature and technology subject cluster **Table 3**

Education	chance of success	income			% of total non-sci/tech
		starting	top	job opportunity	
Economics	+	+	+	+	23
Health	+	+	+	+	40
Law	+	-	+	+	7
Social	+	-	-	-	20
Language and Culture	+	-	-	-	10

(+ = own study scores higher)

Source: de Jong et al. (2001)

they believe will be their position in the labour market.

Students always look on their own studies as offering the best chances of obtaining the diploma. In general, the differences for science or technology range between 15 and 20 percentage points. This means that students who qualify for education in science or technology choose a subject in which they believe they stand a significantly better chance of obtaining their diplomas. Table 3 indicates, in addition to the chances of success, an overview of the other results of the analyses for first-year students in AHE with a nature and technology subject cluster. A '+' in this table indicates that their expectation is higher for their own studies than for the study in science/technology. The last column shows how this group is distributed among the various sectors.

In terms of all characteristics, an ample majority (63 %, economics and health) of the students have higher expectations from their own studies than from science/technology. It is perfectly clear why these students did not choose to study science or technology. This also applies to law students. In science/technology, they expect only a higher starting salary; in terms of the other characteristics, their own studies score higher. In contrast, students in the social and language and culture sectors have higher expectations from studying science/technology with regard to income and chances of finding a job but consider their chance of succeeding in a science or technology course to be lower. Given the outcome of the decision-making process, the lower chance of success apparently outweighs the expected benefits of science/technology.

The results in Table 3 also provide insight into the possibilities of stimulating students by financial incentives to choose a scientific education. Most students both consider the uncertainties of studying science/technology (affecting success) greater and also expect to gain more from their own studies, in income and job opportunities. In order to influence the decision-making process of these students, both these aspects must be compensated. This probably means that these students can be induced to opt for science/technology education only through strong stimuli. For students in the social and language and culture sectors, only the chance of success seems to be a barrier. This group may possibly be tempted by changes in the study programmes offered in science and technology.

To assess the effect of direct stimuli, students of the 1997 cohort of freshmen were asked whether a number of possible policy measures would have influenced their choice in favour of science or technology. We can use this data to make a cautious estimate of the additional number of students that would result from particular measures (See Felsö, Van Leeuwen and Zijl, 2000; Berkhout and Van Leeuwen, 2000). Students from non-sci/tech courses were selected for indicating that they would 'definitely' (score 10) have chosen a science or technology course if a certain measure had been introduced and the figures assessed for the number of first-year students in the non-sci/tech courses concerned. Table 4 shows the results for six specific measures.

The measures are more effective for students in PHE than for students in AHE. The measures can be roughly divided into two groups. A job guarantee has about the same effect as no tuition fees for sci/tech studies and a better tie-up between secondary education and higher education. These measures cause an increase in the number of students of some 8.5 % in PHE and 5.5 % in AHE. The other three measures are less effective and hover around 6 % (PHE) and 4 % (AHE).

In addition to the effectiveness measured in numbers of additional sci/tech students, the cost-effectiveness of some of the measures considered has been calculated. The yield (additional sci/tech students) was related to the costs involved for a particular measure⁽³⁾. The calculations (see Table 5) are based only on the first year of study.

(3) Introducing a job guarantee, improving the tie-up or increasing the chance of success also entails costs, but they are difficult to determine with accuracy and are borne only partly (directly) by the government. For this reason, cost-effectiveness has not been calculated for these measures.

**Additional students choosing a study in science/technology as a result of several concrete policy measures** **Table 4**

		<i>Additional first-year students choosing a sci/tech study following the introduction of</i>					
		no tuition fees sci/tech study	additional grant sci/tech study of EUR 340 per month	90 % chance of success in a sci/tech study	better tie-up between secondary and higher education	job guarantee for students in sci/tech study	higher starting salary after a sci/tech study
increase in sci/tech PHE	number	5 300	3 950	4 500	6 150	7 000	4 000
	% point	7,5 %	5,7 %	6,3 %	8,6 %	9,8 %	5,7 %
increase in sci/tech AHE	number	1 600	1 150	1 200	1 400	1 750	700
	% point	5,4 %	4,0 %	4,3 %	4,7 %	6,0 %	2,2 %

Source: Felsö, Van Leeuwen and Zijl (2000)

Costs of some concrete policy measures aimed at stimulating opting for a study in science/technology **Table 5**

		<i>Additional students choosing a study in science/technology</i>					
		no tuition fees sci/tech study	additional grant sci/tech study of EUR 340 per month	90 % chance of success in a sci/tech study	better tie-up between secondary and higher education	job guarantee for students in sci/tech study	higher starting salary after a sci/tech study
<i>PHE</i>							
increase in sci/tech	number	5 300	3 950	4 500	6 150	7 000	4 000
	% point	7,5 %	5,7 %	6,3 %	8,6 %	9,8 %	5,7 %
Cost of measure	EUR million	23	68	-	-	-	23
- already opted for sci/tech	EUR million	11	53	-	-	-	18
- additional sci/tech	EUR million	7	15	-	-	-	6
Cost per student (¹).	EUR	4 400	17 200	-	-	-	5 700(²).
<i>AHE</i>							
increase in sci/tech	number	1 600	1 150	1 200	1 400	1 750	700
	% point	5,4 %	4,0 %	4,3 %	4,7 %	6,0 %	2,2 %
Cost of measure	EUR million	11	33	-	-	-	10
- already opted for sci/tech	EUR million	9	28	-	-	-	10
- additional sci/tech	EUR million	2	4	-	-	-	1
Cost per student (¹).	EUR	7 000	29 000	-	-	-	16 200(²).

(¹) The total cost of the particular measure in the first year per additional science student. Example of calculation: for students in PHE, the abolition of tuition fees for sci/tech studies costs EUR 23 million [= (12 900+5 300) * EUR 1 278] and results in 5 350 additional students; cost per student [4 400 = 23 000 000/5 300].

(²) First year EUR 454 additional salary per month, the government contributing 50 % and it being assumed that 50 % of the students will later actually qualify for the bonus.

Source: Felsö, Van Leeuwen and Zijl (2000)

Looking at the three measures for which cost-effectiveness has been calculated, we may conclude that abolishing tuition fees not only leads to the highest number of additional students, but is also the most cost-effective. In the first year of study, the costs of this measure roughly amount to EUR 4 400 (PHE) and EUR 7 000 (AHE) for each additional student in a science/technology course.

Conclusions

In this article, we have shown that the Netherlands has ample sci/tech reserves. Under present conditions, most of them are choosing a non-technical study on rational grounds. Specific measures could potentially lead to a substantial increase in the influx into science and technology. The costs involved, however, are considerable, and cost-effec-



tiveness is usually low. Also, the measures studied have not been tested in practice and the margin of uncertainty is wide. Both the government and industry have called for a Delta Plan to be drawn up for science/technology. In this respect, it is important to reflect on a stimulating policy focused on educational institutions (adoption of best practices), pupils (inducing them to choose technology) and enterprises (offering entrants experience-gaining opportunities and career

prospects). Since we still do not know enough about the degree to which study options can be influenced, several studies notwithstanding, the effects of any adaptation of the student grant system are uncertain. Policy changes and investments in education should, therefore, be coupled with scientifically controlled experiments, the effects of which are evaluated. We shall then know in a few years how all this works out and which measures may be expected to have an effect.

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Annex I

The annual Student monitor (de Boom et al., 2003) publishes data on students based on a representative sampling from the entire Dutch student population in higher education. This sampling is used to outline a reliable, year-on-year picture of students in Dutch higher education. This is done on the basis of a sampling that is stratified by type of higher education (PHE/AHE), academic years and sectors.

The Study choice monitor (SCM) is the product of cooperation between Aromedia and SEO Amsterdam Economics. In the SCM, pupils' behaviour in choosing their studies is charted from a questionnaire to be completed by the pupils by computer. They are assisted in this by the careers master. The population investigated comprises the pupils of the final two school years in five-

year general secondary education and six-year pre-university education. The SCM started in 1996 with a total response from over 5 000 pupils. Today, more than 6 000 pupils complete the questionnaire each year (more than 11 % of the total population).

In the research project Participation in higher education (DHO), SEO Amsterdam Economics and SCO-Kohnstamm Institute, both of the University of Amsterdam, gathered data on students in higher education who had enrolled for the first time at an AHE or a PHE institute in the academic years 1995/96 and 1997/98. Both samplings are stratified by type of education (PHE/AHE) and sectors (eight PHE and eight AHE). The respondents were approached in their first and second years of study.

Key words

Educational policy, labour demand, science policy, motivation, choice of studies, higher education.



Annex II

The Dutch education system

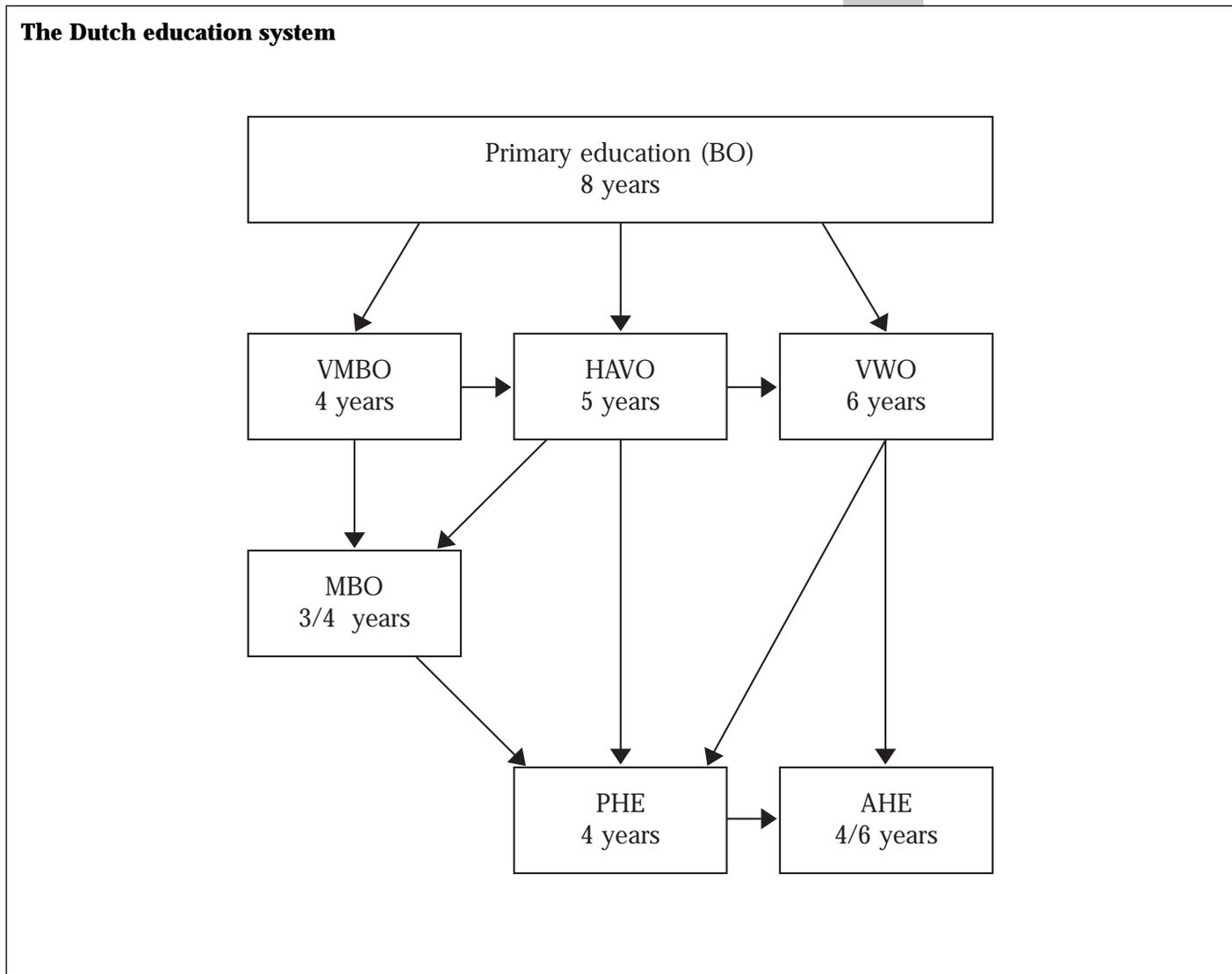
Full-time education is compulsory in the Netherlands for all children aged 5 to 15. For 16 and 17 year olds, partial education is compulsory.

Children begin their school careers at the age of four in primary education (BO). Later, most of them move on to secondary education (VO), which branches into:

- ❑ pre-vocational secondary education (VMBO);
- ❑ senior general secondary education (HAVO);
- ❑ pre-university education (VWO).

After secondary education, pupils move on to senior secondary (or intermediate) vocational education (MBO) or higher education. MBO is di-

vided into a vocational training programme (bol) and a block/day release programme (bbl). This type of secondary education has two functions: qualifying for the labour market and for professional higher education. Dutch higher education has two levels: professional higher education (PHE) and academic higher education (AHE). Traditionally, AHE is considered to be the highest level of education. Graduation from HAVO gives direct access to PHE. Another route to PHE is through MBO. The most common way to university is six years of VWO. Another way of enrolling in university is graduation in the first year of a related type of PHE; also, graduation from PHE gives access to AHE. The figure below shows the structure of the Dutch education system.





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Lisbon strategies in the global context

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Changes and issues in the validation of experience



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Concerning the validation of experience, in France we are shifting from validation of prior certificated learning (VAP) to validation of prior experiential learning (VAE); validation of experience has been instituted as a right, as has training. But even if this transforms certification practice, we should not regard the change solely as a consequence of formal adjustment. To some extent, the advent of VAE is establishing a new relationship between training and economic activity, ever since it was reinforced by new provisions for training (Law of 2004).

Our position is that like the changes affecting training, the development of validation is part of the trend of adapting to a lack of job security - it is 'a convenient tool in the face of increasing insecurity regarding jobs and a secure wage' (Lenoir, 1999: 9). It constitutes a kind of 'safety-first principle' applied to the value of work and to the potential that this value represents. To this extent, it can be compared with the theme of employability. Similarly, this procedure has a place in the relaunch of mobility and of the 'social elevator' that the crisis of 1970-1980 seemed to have brought to a halt. Lastly, the job shortage (accompanied by a shortage of workers in some fields) and recruitment problems also play a part in it.

This article is primarily concerned with the economic and social stakes of validation. Other aspects will not be taken into account except insofar as they shed light on the economic issues - i.e. institutional conditions for organising validation, educational methods of implementation, regulatory provisions and their policy framework, etc. In addition to the reference literature, the text is based on university validation practice and on an analysis of the questions emerging in this connection. Thus, greater emphasis will be placed on analysing the situation in universities.

Armed with the results of this initial experience and the problematic aspects outlined, we believe that we must begin by analysing the impact of the validation of experience with reference to the way in which such validation has changed in both training systems and certification practices. Its effect on how organisations function and how the production system is regulated can then be understood as a yet outstanding issue; in this context, an update on the position of universities may prove enlightening. Finally, global issues with a substantial impact on Europe can also be outlined.

Changes currently under way

In order to understand the issues currently involved in the various modalities of validation of experience in France, we need first to summarise briefly the main changes brought about by the 2001 Law on 'social modernisation'. This also enables us to update the new 'social logic' included in this Law, and hence to understand the conditions put in place for adaptation to new modes of improving the status of training in vocational activities, in a globalised economy.

The historical dimension of the changes currently under way

The regulatory context of validation in France is undergoing a major transformation, namely the shift from VAP to VAE. We shall not attempt to list all the changes, but shall describe some fairly radical changes brought about by the Law. For universities, the retention of a 1985 text on validation of prior personal and certificated learning, VAPP, leads to the coexistence of two systems, something that raises very delicate questions that will be addressed later.

This article analyses the main changes in the rules for validating experience in France and of what they mean for society. It goes on to consider university validation practices. The way in which this system is evolving offers a chance to identify the issues involved for the economy and for society, with particular attention to the expected consequences for universities. This analysis enables us to understand how the problem of validating experience is linked to current economic globalisation and sheds light on the scope of lifelong training.

**Substitution and duality of validation schemes** **Table 1**

Fields of validation	Decree of 1985 VAPP (retained)for universities	Law of 1992 - Decree of 1993 - VAP (repealed)	Law of 2001-02 VAE
<i>Duration of work experience required</i>	No duration is set for the experience	5 years' work experience	3 years' work experience (full-time equivalent)
<i>Nature of the experience to be validated</i>	Personal and work experience	Work experience only	Work and personal experience
<i>Qualification field involved</i>	University-level qualifications only	State education qualifications	All qualifications listed in the national directory*
<i>Field of validation of qualifications aimed at</i>	Access to preparation for a degree with possible exemptions	Partial validation only of the qualification aimed at	Possible validation of the entire qualification aimed at

* Inclusion in the national directory of certifications

These new schemes have established a logic of social credibility. Certification is entering the sphere of 'social transactions' (Bonami, 1998). It is no longer the product of a particular activity developed in order to attain it, but is instead a quest for a transaction between two separate spheres, namely vocational activity and certification per se. Applicants for validation seeking recognition of the value of their experience often ask, entirely legitimately, 'What can you give me for my x years of experience?' This question is expressed in all the more arbitrary fashion, focusing on a 'good' (the qualification) in that the transaction is performed in an area characterised by a degree of abstraction as regards their working and living environment.

An entitlement to validation is created, by the same token as the right to training that already existed. In reality, however, these two entitlements do not involve individuals and their organisations in the same way - the second one is applicable within any training body, including the enterprise that sponsors the training. In contrast, the entitlement to validation refers to a body authorised to provide certification, of necessity separate from the enterprise that may have motivated this action. In the latter case, access to certification is of itself a specific step consisting in bringing together and formalising the 'signs of experience' capable of being validated. This step is much more costly in psychological terms than is participation in a training course, and the person seeking validation has to make the most effort. It is as if the effort put into working has to be extended in order for the formal worth of this work to be recognised. The paradox inherent in the validation of experience is that it introduces an apparent separation between training and validation (in the case of overall validation, there is no longer any for-

mal training activity), yet imposes on applicants a need for work per se that far exceeds the involvement required in most training measures.

A third path for accessing qualification is coming into being, one that can be regarded as involving a synthesis of the two existing paths - training (initial training in particular) and experience as recognised under the conventions obtaining in a working environment. Validation of experience adopts the pre-eminent role of the validating body in certification from the first path, and the crucial weight of the experience recognised from the second. Enterprises need, above all, an externalised validation body in order to move away from assessment by the internal hierarchical authority alone. On the other hand, it is to be expected that they will often prefer to internalise the part of the procedure that consists of assembling the applicant's ('supporting') documentation. (See diagram in the annex.) This is so that they will have control of the recognition of experiential learning and will derive at least a symbolic benefit from it with regard to their employees. Ultimately, this change could lead to a reduction in the importance of initial training qualifications, unless more experience (in the form of work placements) is required in order to obtain them.

A broader concept of experience induces us to take account of prior experiential learning in the context of both work experience and personal experience (commitment to the community, political and trade union commitment, etc.). This involves both extending the training/employment relationship to community or leisure activities and eliminating the borders between the two spheres of adult life, namely work and private life. This is directly in line with the increasing share allotted within organisations



to subjectivisation and individualisation of relationships with work and with work objectives (Vincens, 2002).

The reduction in the length of experience required is, without a doubt, aimed at the youngest generations. Their training paths are evolving into a transitional path which, while it is growing longer, combines initial vocational experience and training increasingly closely. It is not a case merely of recording students' activities and their wish to extend their qualification, but also of moving towards an integration standard based on young people with experience (Youth Employment Services - see box - could have been the archetype of this, if they had survived). The shorter time periods required also presuppose the recognition of job instability and mobility as a diversified source of experience capable of being validated. VAE accords with the 'new areas of mobility' that the vocational training reform currently under way in France is aiming to establish (Morin, 2003).

Ratification of qualifications is disappearing in favour of entry in the national directory of certifications. This new accreditation procedure, which applies to all certifications, will ultimately lead to a focus on a homogeneous area of certification, and hence to the loss of a degree of distinction for qualifications obtained in the state education system. This arrangement will continue to exclude university qualifications, for example, which are, strictly speaking, local, but will include sectoral vocational training certificates (CQP), based on occupational models or, indeed, jobs. There are, however, two noteworthy exceptions - certain qualifications protected by professional orders (doctors, lawyers) and competitive access to civil service posts (titulaires).

In this context, it is to be expected that different validation markets will emerge; these could relate to 'positioning', 'accompanying measures', and perhaps to the actual certification conditions, if the various entitlements to access to full certification were to become more professionalised (substitute tests, adherence to examining board instructions, etc.) (see diagram in the Annex). Many modalities are involved in organising and authenticating these markets, beginning with specification of the certifications eligible for inclusion in the national directory of certifications. They also pre-

Youth Employment Services Programme

The Youth Employment Services Programme, set up under the law of October 16th 1997, is to end.

The announcement that the scheme will be gradually wound down is included in the 2003 Public Finance Bill. State aid will continue to be provided for organisations whose activities offer the greatest social benefit in order to support them beyond the initial five-year period.

For the record, the object of the programme was to:

- Set up and develop new and socially useful businesses to meet emerging and unmet local needs
- Enable 350,000 young people to work in these businesses and gain practical experience of a working environment.

Its main features were:

Eligible employers

The scheme applied to the non-commercial sector: local authorities, public (but not government) bodies, private bodies, non-profit-making organisations (voluntary organisations, foundations, provident associations, trade unions, corporate commissions, etc.) and private companies providing a public service.

Eligible young people

Young people under 26 years of age, with or without educational qualifications, or under 30 and registered disabled or without sufficient work experience (4 months) to qualify for unemployment benefit.

Youth Employment Contracts

A permanent or short-term contract of 60 months, governed by civil law even when concluded with a public body.

State aid

A total of EUR 15,924.55 a year per post for a period of 5 years.

Cf. <http://www.nsej.travail.gouv.fr/etranges/anglais.html> (consulted on the web on 10-02-2005) [Author's note]

suppose that a body of professionals will be constituted to receive applications and to conduct a feasibility study (based on the careers adviser model or counter-model), in such a way as to establish barriers to admission and effective selection without destabilising training provision; they will be experts capable of assessing the quality of applications. Lastly, these modalities involve approving support bodies for trainees capable of helping to express their experience. This institutionalisation process could go as far as to call into question the certification monopoly enjoyed by public or joint training systems.

Validation practices

Two types of empirical data are used to describe these practices: general statistical data on validation activities in France and local data supplied by universities. This overview will be supplemented by the thoughts of a VAP practitioner.

National data

As yet there are no significant data on VAE; the data available relate primarily to VAPP (Decree of 1985) for higher education and to VAP (1992-93) for state education qualifications (DEP, 2003). This inevitably limits the impact of statistical data on our work, but it


Trend in validations by type at LPU* (1985 and 1992/93).
Table 2

All courses: validation requests (1)/validations agreed and ('success' rate) (2)

	(1) 96/97	(2) 96/97	(1) 97/98	(2) 97/98	(1) 98/99	(2) 98/99	(1) 99/00	(2) 99/00
Decree of 1985 VAPP	559	274 (49)	563	336 (60)	763	363 (47)	926	372 (40)
Decree of 1992-93 VAP	11	11	13	12	50	35	76	57
'1992-93' percentage	2 %	0,4 %	2,2 %	3,5 %	6 %	9,6 %	7,5 %	15,3 %

* The Ministry has long regarded LPU as over-scrupulous in its validation practices. Since this time, it has largely made up for its weakness in this area.

must be remembered that, to a great extent, VAP practices anticipate the trends that are likely to be confirmed by VAE practice.

Even so, with regard to vocational and technological education it should be noted that under the VAP system, the number of applicants in France increased from 816 in 1995 (the year in which a new practice was fully implemented) to 4578 in 2001 (at the dawn of application of the new Law). In 2001, in a scheme involving mainly members of the working population in employment (82.3 %), the qualifications with the most requests for validation were the BTS (higher-level vocational training certificate) (45 % of applications), the CAP (vocational training certificate) (18 %) and the vocational baccalaureate (15 %). In the same year, the relationship between exemptions applied for and exemptions obtained was as follows: the most accessible examination was the CAP, with a success rate of some 70 %, followed by the vocational baccalaureate (65 %) and the BTS (55 %).

In higher education, VAPP certificates were applied for by just over 8000 people in 1996, but by almost 12 000 in 2001. As for VAP, it progressed at a more modest rate to almost 2000 applications in 2001. Both VAPP and VAP primarily relate to degrees (32.1 % and 26.1 % of applications respectively). The new vocational degrees involved VAP rather than VAPP. A study of applicants by age shows that the older they are, the more likely they are to apply for higher-level qualifications, and that these applications primarily involve intermediate occupations. Lastly, it should be noted that practices and the number of validations vary greatly from one establishment to the next (Le Roux, 2003), regardless of the number of students and courses in particular.

At both levels of education (secondary and higher), there has been a sharp increase in validation in the past few years, although it remains fairly marginal in relation to the

traditional certification methods. Analysis in greater depth of the validation actually implemented also shows the great variety of practices that the fairly flexible rules have not yet standardised or consolidated (Ancel, 2002).

In the long term, the coexistence of VAE and the 1985 Decree should establish a particular situation for university validation in comparison with other validating bodies, including the state education system. 'The launch of VAE does not in any way prevent people from applying for an exemption from qualification for access to training (+17.2 % in 2002), with such applications accounting for almost nine out of ten validation requests in higher education' (Le Roux, 2003). Among other things, this could indicate the existence of a potential demand for exemption outside universities, which however cannot be put into effect since there is no legislation authorising it. It should also be noted that with VAE, the qualifications applied for are at a higher level than when it is a question of obtaining exemption from examinations (Decree of 1985). This confirms the need to establish a distinction between validation as a right to resume studies and validation as recognition of knowledge acquired.

Local data - practice in one university

Very general data can be formulated for one university, Louis Pasteur University (LPU), specialising primarily in science (see Table 2 below). It will be seen that LPU shares in the general tendency for a marked increase in the demand addressed to this scheme, with VAPP clearly predominating in applications for validation. It should be noted that success rates vary widely, indicating that little has yet been done to consolidate practice in pedagogic committees, which, unlike initial training boards, are characterised by weak routines.

Analysis of validation by courses (see Table 3 below) shows that VAP is requested above all for LPU's 'vocationalised' degrees (main-



Trend in validation by courses (Decreets of 1985 and 1993) **Table 3**
('General' science courses/other courses)

Courses	96/97		97/98		98/99		99/2000	
	VAPP	VAP	VAPP	VAP	VAPP	VAP	VAPP	VAP
1985/1992-93								
Physics degree	58	36	42	28	34	27	34	28
Masters in physics	12	5	6	6	10	3	8	8
Mech. eng. degree	16	6	12	7	11	7	13	10
Masters in mech. eng.	5	1	0	0	2	2	8	7
EEA degree *	88	25	61	25	48	17	49	35
Masters in EEA	11	1	10	4	14	9	13	5
Science degree	29	14	26	17	33	19	24	18
Masters in science	1	1	3	1	2	0	0	0
Total for sciences Up to degree and masters **	220	89 (40 %)	160	88 (55 %)	154	84 (55 %)	149	111 (75 %)
Other qualifications ***	350	196 (55 %)	416	260 (62 %)	659	314 (46 %)	853	318 (34 %)
Other qualifications	60 %	67 %	72 %	74 %	80 %	77 %	84 %	70 %

* Electricity, electronics and automation

** The figures in parentheses show the rate of 'success' or acceptance of application documents.

*** Postgraduate qualifications (DESS), masters from IUP, economic sciences, psychology, education science, multidisciplinary degree, etc.

ly DESS [qualification in specialised higher studies) and for training courses whose 'general' nature is particularly problematic - economic sciences (a substitute for business training), psychology, education science, multidisciplinary degree. This raises a question particularly with regard to psychology qualifications (sought above all by teachers who wish to become educational psychologists) and education science (which is in demand from professionals with all kinds of backgrounds in order to obtain access to the university teacher training institute (IUFM)). Do these courses constitute vocational training courses, or is their function to serve as a means of access to other (vocational) training courses?

Even if they do not cover VAE, these very abbreviated and outdated numbers show, firstly, a trend that only the greater or lesser success of the applicants seems to frustrate. This trend illustrates above all the situation created by the coexistence of two validation systems, one operating on the principle of entitlement to access to a qualification, with or without exemptions, and the other operating as (inevitably partial) certification, prior to the entry into force of VAE. Since the first system has proved to be faster and more flexible, its advantages can only become greater when a difference in cost also plays a part (Triby, 2003). Today VAPP is still a procedure that is usually free, while the new VAE has to be paid for (between EUR 500 and EUR 1200).

In practice, however, the most striking aspect is the curious alchemy that comes into play in transforming experience into a qualification. This 'conversion' (in the financial sense of the word) is likely to be strongly circumscribed and formalised with the implementation and operation of VAE boards whose members are obliged to base their decisions vis-à-vis full or partial certification on a dual reference system (employment and qualification). This being so, validation decisions will continue to be acts of monetary conversion for several reasons. Validation of experience establishes a compatibility between two separate worlds that are heterogeneous or even opposites (Ancori and Cohendet, 2003):

□ Between two value systems - economic value, sanctioned by the market, and the value of free access, in terms of the historical progression of knowledge and the ways in which it is transmitted, i.e. essentially via education and university. For many university students, academic learning cannot be 'translated' into experiential learning and vice versa, because it does not have the same relationship with the activity.

□ Between two temporalities - sequential time, or the 3 ages of man (training, building on training, and decline) and continuous time (lifelong training). In other words, validation of experience corresponds to a shift from capital logic (a qualification) to be built on (in the activity), to a logic of val-



ue added (the activity) to be validated in the form of a qualification. This shift in the time-point of certification calls into question not so much the value of university qualifications, but the capacity of universities to exert an influence on this value.

□ Between two institutions that are largely strangers to one another - the enterprise, governed by the economic evaluation of human capital, and the university, operating in accordance with a selective logic of 'pedagogic' evaluation of formal learning. The strong misgivings of universities are due to their particular culture, which shuns the objectivisation of the effects of teaching. Marks are sufficient, and speak for themselves.

□ Between two spheres of existence - the private, personal sphere and the public, socialised sphere. The mediation offered by validation does not relate only to social, personal and vocational experience. As an expression of a more intimate dimension of the individual, it is also of interest to the adult who is coming back to training after experiencing failure in initial training, or the person who goes to university to find answers to personal questions.

The financial issues involved in validation

To clarify the analysis, a distinction is made between issues facing the enterprise and issues concerning the regulation of economic activity. It should be remembered that there are strong connections between the two sides of the same reality, and that validated knowledge represents a dual signal. This involves not just certification but above all certification by experience; a procedure of this kind acts as an effective filter, in both practical and symbolic terms. Within this trend, the university serves the purpose not only of producing knowledge and certification but, increasingly, of regulating the flow of entrants to the labour market. It is in this sense that it plays a large part in validation.

The financial issues involved in VAE for companies and the system of production

For companies, validation arises from a dual need to reduce training costs and to maintain an optimal human capital potential. Today, this need is strengthened by an increasingly powerful market constraint, mak-

ing it necessary to rationalise expenditure, and by the importance of workforce training, which requires better management of human resources - hence the idea of validating experience. Not only does validation help to make it easier to 'read' the labour market, but it also reinforces the role of qualifications as social 'selectors' and signals for the market.

Today's enterprises are also interested in re-vamping methods for classifying employees; existing methods seem too dependent on political considerations such as collective agreements, wage laws, etc. For companies it is thus a matter of reappropriating a capacity to classify and to appoint by increasing access to certification. Certification also helps to free differentiation between individuals from the unknown quantities of intersubjectivity and the resonance of 'strongly linked networks' and other 'social capital'. Moreover, enterprises need to find a scientific basis for work organisation and human resource management, one that is standardised by an external body and therefore difficult to question. A codified translation of vocational experience into certification can help to achieve this by legitimising companies' capacity to define certifications (CQPs [vocational certificates] in particular). This power is to some extent reinforced by the progress made in enterprises, as regards certification of products at source, of today's processes (Paddeu and Savoyant, 2003).

Finally, it is imperative that enterprises find ways of managing working relationships between the different 'generations' of employees, in circumstances of slower rotation, ageing workers, greater use of temporary workers (particularly young workers), and increased qualification levels of new entrants to the labour market. VAE makes it possible to add value to the work of the oldest employees by giving this work a designation in accordance with the categories of certification obtained by the younger workers. It also makes it possible to relativise the value of qualifications submitted by new entrants.

In other words, validation contributes, for companies, to a rationalised comparison between internal and external labour markets within increasingly problematic demographic circumstances. Indeed, whether it is the employer or the employee who has recourse to one of these markets, VAE can contribute



positively to knowledge management. The employee's mobility on the internal market, within her company, is improved by official recognition of her skills, just as she can better defend herself on the external market against competition from more highly qualified candidates. In principle, the employee is better protected against unemployment and can entertain hopes of attaining more highly skilled jobs. On the other hand, it is also possible that an employee whose experience has been certified will cope better with the prospect of redundancy, and the employer will regard this possibility as a lesser risk; similarly, the employee may be of greater interest to an employer seeking identifiable applications. We should remember that the two markets share 'a common aim: organising competition between employees' (Leclercq, 1999: 279), which establishes the link with a more macroeconomic vision.

For the system of production as a whole (i.e. at the macroeconomic level) the question of educational level arises in a context of increased international competition and increasingly formalised comparison. The 'knowledge economy' is, first and foremost, an economy in which the level of certified knowledge is thought to make a difference. Moreover, as the relative shortage of skilled workers leads to a rise in wages, companies have an incentive to make arrangements that buck this trend by significantly increasing competition between workers with certified knowledge. Finally, we should note that the system needs to ensure greater worker mobility. This concern for mobility is due to growing unemployment and increasingly precarious employment conditions (Boyer, 2000).

Validating experiential learning by certification thus has a dual meaning. It allows both the company to relieve itself more easily of the constraints of the wage bond and the employees to expect to 'bounce back' if they are made redundant. Thus, validation facilitates the tendency for companies to loosen their relationship with their employees (Rozario, 2003). This in turn is likely to reinforce the need for clear signals, and thus the importance of certification in the demand for work.

VAP in socioeconomic adjustment

For the political authorities, and reflecting users' concerns, validation only has mean-

ing if it allows access to qualification or, more generally, certification. But inasmuch as VAE reverses the customary relationship between experience and certification the State and the social partners inevitably interfere with market regulation by adding value to career paths via certification bodies deemed independent of the market.

Despite the necessity of involving the political authorities, their involvement is problematic, leading to questions about the value of public qualifications compared with the many forms of private validation (in particular CQPs), which are expected to rise substantially in the future (Merle, 1997). This calls into question a key element of public regulation. At the moment, qualifications, more than 90 % of which are issued by public players, constitute the most practical 'standard signal'. It can be argued that the more accurately VAE 'translates' vocational experience, the more its value or added value will be recognised and accepted by the labour market. Thus it is the effectiveness of the meeting of two bodies of knowledge and of their conversion (particularly in the validation board) - one representing experience and the other being more formal - which will be permanently open to question.

Moreover, we cannot ignore the significance of training costs for society as a whole, or the need to justify their rise in a context of diminished legitimacy for collective levies, particularly for the universities. It is not only the level of direct costs that is at issue, but also the way in which they are distributed and the costs deriving from training. The development of VAE could represent a redistribution of responsibility for training with the social partners, by the intermediary of joint financing bodies and local authorities, especially regional authorities. This redistribution will be all the more significant when validation involves job-seeking populations. Training leading to a qualification also includes time spent on production, as evidenced by the substantial growth in on-the-job training. Thus, for employed workers validation of experience means time spared for production.

Furthermore, for reasons that are essentially budgetary and political, there is a definite need to speed up modernisation of the initial training system (vocational training and higher education); the difficulty of keeping costs under control and encroaching bu-



reaccreditation underline the need to change this system's organisation and practices. To this end, action should preferably be taken 'outside' the system when it no longer seems possible to achieve reforms 'inside' it, or when such reforms appear to be largely ineffective. Without a doubt, the development of VAE can play this part, inasmuch as this procedure undertakes to call into question, step by step, this system's reference points, all too often designed to be intangible - the occupations aimed at, the teaching methods, development of a path to accessing knowledge, etc.

The financial issues involved in validation for universities

Validation of experience leads to much greater integration of universities into economic activity, both in terms of their resources and prospects and of their mode of operation. This analysis is especially applicable to French universities, now facing a critical situation in terms of defining their mission and finding the means to implement it.

University resources and pedagogic risk

Social and academic evolution (i.e. an end to extended education), in combination with the demographic tendency of the last hundred years or so (the ageing of society), weighs heavily on student cohorts that are stagnating or even diminishing in number (CNE, 1987). As an indirect consequence, tenure for teaching posts and hence for research posts in public laboratories is called into question. Because research is publicly funded in France, those involved in research which is not entirely subject to the market are not particularly concerned by this development, rejecting as they do the market's interest in applicable results and its indisputable myopia. But universities are now called on to diversify their funding sources. Validation could constitute an alternative source to direct funding, following the example of continuing training and distance training ('digital' campuses).

This being so, resources emanating from VAE are problematic. Half these resources can be expected to come from enterprises and individuals, and the other half from public funding, and regional funding in particular. Then 'support' may be given by companies or by other agreed bodies. This means that lucrative activity may elude the vali-

dating body, in this case the university. Moreover, since VAPP and (partial) VAE do not in principle justify presumptive selection of students, they call into question the principle of training with limited numbers. This creates risks for training quality and the social status of the qualifications concerned.

Last but not least there is also a pedagogic cost: validation of knowledge will lead to a generalisation of the student mix in university courses. This coexistence will necessitate a change in practices and teaching relationships. Universities will have to get the measure of the trend in expectations and in the previous knowledge of increasingly varied groups (Pratiques de formation, 2001). There is also a great risk that qualifications will lose some of their prestige, not so much because of increasing numbers or over-generous awarding, but because of the heterogeneous content introduced by VAE. This is because it makes it possible for an equally varied group to enter training and thus for widely varied knowledge to be validated by means of the same qualifications. This devaluation will not necessarily reduce the need to have recourse to qualifications. On the contrary, they will become more and more necessary, but less and less adequate.

The vocationalisation of university studies

The already longstanding vocationalism of university studies (DUT [university-level technology qualification], DESS, vocational research degrees, etc.) and the more recent creation of new vocationalised qualifications (IUP [vocationalised university institutes], vocational degrees) have been a major factor in the development of VAP, now VAE. Without a doubt, the latter will bring about a more significant change - the translation of all its qualifications into knowledge capable of being mobilised in vocational skills and situations. This shift has one direct implication, already identified with the preceding law - 'involving universities in reflecting on their programmes and, in particular, on the training objectives they pursue' (Feutrie, 1999, p. 56). This 'reflection' is likely to affect the relationship of university disciplines with each other, to the detriment of academic disciplines which most universities regard as being impossible to translate into vocational or personal experience.



In the Modernising Law of 2001, the validation board has supreme power as regards the 'scope' of validation, and hence 'the nature of the knowledge and skills that must be subject to supplementary checking' - this is 'prescribed' by the board in the form of training or experiential supplements, realisation of records or reports, etc. This supreme power seems to fall within the university tradition. With VAE, however, supreme power is the opposite of the traditional position. In the latter, the board is all-powerful, with teachers marking students on the knowledge they themselves have imparted. With VAE, the board must refer to the reality of the vocational and social activity. It derives its legitimacy and imposes the arbitrariness of its evaluation only inasmuch as it is capable of translating its academic knowledge, usually ensuing from a single discipline, into syncretic knowledge, action-based knowledge, applied knowledge, etc. Thus the board is involved in legitimising work organisation methods and their capacity to produce knowledge.

Future prospects: validation in European context and globalisation

To bring our reflections to a provisional close, we will demonstrate that the questions raised are not restricted to France. On the contrary, they arise in more global trends, and particularly in trends across Europe. Validation of experience may still operate in accordance with specific national provisions, and may not yet have acquired a European regulatory framework, but it is practised in many other European countries (UK, Spain, Italy, etc.).

Standardising higher education qualifications across Europe

In universities, implementation of the VAE system intersects the reorganisation of studies broken down into first degree, masters and doctorate (LMD), and the generalisation of the breakdown of knowledge acquired from study in terms of half-yearly credits (ECTS). This is no coincidence: by supporting the segmentation of preparation for qualifications and student mobility, universities are helping to increase the gap between training and certification. They are increasing the need to translate their qualifications into training modules achieved in accordance with rules other than those of the universities awarding the qualification. This rein-

forces the tendency of those applying for higher certification to calculate in terms of transferable rights. Each of these trends gives greater weight to the validation of experience. Moreover, structuring courses on the basis of LMD involves the same conversion for universities as the transition to VAE, i.e. conceding that what counts is the knowledge actually acquired, itself defined in relation to the subsequent employment situations or training that give it meaning.

Lifelong training

P. de Rozario (2003) compares the validation practices of different countries and notes that 'with validation of experience, we are truly at the heart of the European concept of lifelong learning, and in a world that has never valued knowledge so highly' (!). More than the project itself, validation challenges its practical implications, 'it being possible to associate low employability with lengthy work experience' (Stankiewicz, 2002: 26). Both validation and lifelong training invite a break with the idea that experience alone could generate a supplementary qualification capable of being recognised by the market. If not accompanied by training and, more to the point, by an effort to formalise and evaluate this experience, it is difficult to see how the development of personal abilities could extend throughout one's life. It is, rather, 'lifelong certification'!

Furthermore, lifelong training is a way of confirming that initial training can be conceived only as a form of primitive accumulation, to be made profitable only if continually enriched by further training. This investment is as effective, in terms of reclassification or conversion, as the possibilities it offers to access the new qualifications that certification offers. Ultimately, the invitation to make oneself 'one's own contractor' which underlies this entire project only works if individuals acquire the ability to put their own career paths into perspective and to analyse the working situations that they have experienced. Access to validation is rightly dependent on the construction of such abilities.

Policies for reducing unemployment and recruitment problems

At a time when unemployment is again increasing and traditional policies have seemingly run out of steam, a return to training (particularly training leading to a qualifica-

(!) In this context, see Cedefop's recent report (2003) - Learning for employment - which speaks of a Europe 'of great cognitive intensity'.



tion) represents an arrangement that both enables qualification levels to be raised and temporarily removes job seekers from the labour market. In the event that this return to training is further developed, validation will serve as a kind of lever, since it facilitates a return to study at levels higher than those achieved in initial training. In case of recruitment problems, which could increase if the economy were to improve, an enormous effort would be needed to re-train the working population. Such an effort could prove even more necessary if training of (particularly younger) wage-earners favours general knowledge and social skills. This could lead to a redistribution of training efforts between initial and continuing training, and of course validation of experience would have a place in this.

We must ask ourselves whether it would have been possible for VAE to develop if substantial work had not first been put into reinterpreting vocational training and analysing jobs. Within organisations, this dual task has

crystallised, doubtless too exclusively, around the concept of competences/skills, which expressed employers' hopes that classification methods and methods of regulating working relationships would be radically transformed. Critical work on this concept must continue. Validation of experience clearly has a place here, offering as it does both conceptual and methodological tools.

Putting validation into practice makes it necessary to question both the vocational activity and the certifications regarded as proving the ability to perform it. Validation thus offers the concept of competence/skill an opportunity for practical enrichment and for formal specification. Moreover, it obliges employers and employees to agree to look behind the 'signals', which are so practical and yet so formal. In this sense, competence/skill can leave the field of managerial discourse and give shape to new vocational identities, based on employees themselves formalising their knowledge.

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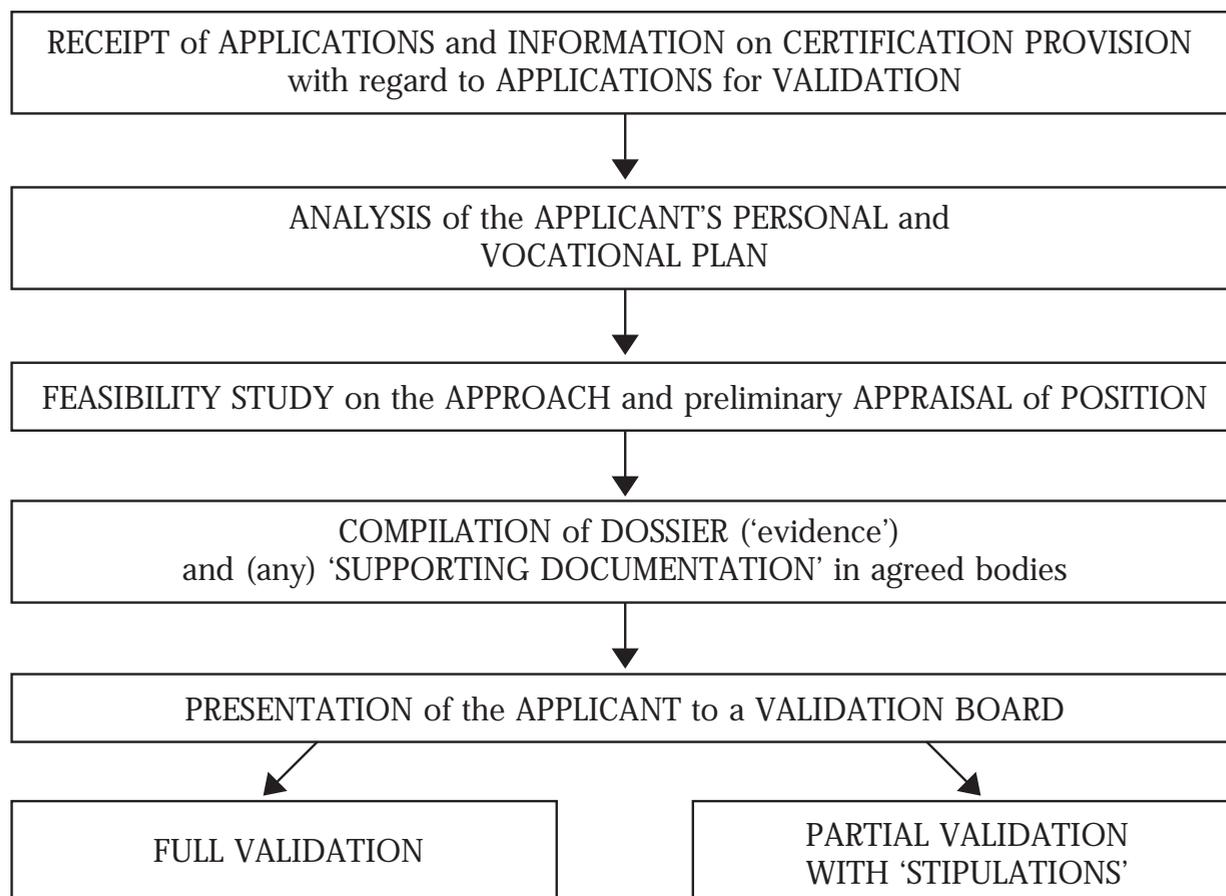
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Key words

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**Diagram (simplified): the stages of the validation process****Annex**



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Educational routes and family aspirations in France, a panel data approach

The decade from 1985 to 1995 saw a very significant increase in the numbers of those staying on at school beyond the age of 16 in France, a process largely underpinned by the development of vocational and technological training. This article examines one of the crucial aspects of this 'democratisation': the creation of educational routes within secondary education. It shows that, all things being equal, early educational failure makes families attach greater importance to success in higher education for gaining access to employment. Educational routes must therefore be seen as the result of the interactions between institutional frameworks and the judgements made by individuals. Nevertheless, the educational investment made by families only very partially offsets the social selectivity of the different streams of initial training.

The French education system went through a process of major change during the decade from 1985 to 1995. The number of school students awarded the baccalaureate, the certificate marking the end of upper secondary education, doubled from 29.4 % to 61.5 % within a cohort of young people. Similarly, the rate of access to higher education surged from 25 % to 51 % of a generation. Previously rare assets reserved for the more privileged social classes, in particular compared to a country such as Germany (Maurice et al.), diplomas and access to the highest levels of the education system have now become very common in French society.

This educational growth was largely underpinned by the development of vocational and technological training. In secondary education, the introduction of the vocational baccalaureate in 1985 marked a particularly significant change. Until then, more than 55 % of young people left the general and technological education stream at the end of collège - the first four years of secondary education which in principle is common to everyone - because they were not considered capable of higher studies. The majority of those leaving initial education completely went on to vocational lycées or (to a lesser degree) apprenticeship training centres leading to the certificat d'aptitude professionnelle (CAP - vocational aptitude certificate) for a specific trade, or the more broadly-based brevet d'études professionnelles (BEP - vocational studies diploma), following which they tried to find a job as skilled workers or qualified employees.

These young people coming out of short-term vocational education (essentially BEP holders) were gradually offered the opportunity of two further years of study leading to a vocational baccalaureate (38 specialised fields at the end of the 1990s, prin-

cipally electricity/electronics, general mechanics, secretarial/office automation, commerce and sales) which, at least theoretically, provided the possibility of continuing on to higher education. Although the principal aim of the baccalaureate remained direct labour market integration (80 % of flows), access to the qualification was intended to reflect the equal status of the different streams of secondary education: vocational, technological and general (d'Iribarne A. and d'Iribarne P., 1999).

This enhanced status for vocational education met two concerns: the first was economic efficiency in that the workforce needed to be equipped with the qualification that would foster competitiveness; the second concern was social justice in so far as access to the baccalaureate, the first stage of higher education, needed to be made more democratic (Verdier, 1994). With those aims in mind, the 1989 Framework Law on the Education System had confirmed the motivational political objective of bringing 80 % of an age group to baccalaureate level by 2000 (the level actually attained was 69 %).

This article seeks to throw light on one of the crucial aspects of this purportedly democratic educational expansion: the creation of educational routes within secondary education. Our initial hypothesis is that the baccalaureate has become a predominant social norm in education for all players in the education system - young people, teachers, employers and policymakers - even more so than compulsory schooling up to the age of 16, introduced in the 1960s. Thus, in a 1992 survey by the Ministry of Education, more than two thirds of families whose children had entered secondary education in 1989 replied that the qualification they aspired to for their child was a higher education qualification.



From this point of view, it is essential to examine how the secondary education system is structured to allow access to this norm. In the following, we therefore first of all look at the different routes leading to the baccalaureate. The question is whether the opening up of different routes has deprived the norm of its sense of uniqueness, this diversification being both the reflection and the source of marked social inequalities transmitted by the conditions under which family socialisation operates. To take our analysis a stage deeper, we will re-examine how students enter the various educational routes leading to the different types of baccalaureate (general, technological and vocational), conditioned by families' value judgements about how effective the qualifications are in providing access to employment. Thus, the last section of the article will simultaneously examine students' educational routes and their parents' aspirations and perceptions of their educational future.

Access to the baccalaureate: the state of diversification of educational routes

This initial section serves to typify the three institutional streams (general, technological and vocational) leading to the baccalaureate, as well as the different routes involved. As well as the impact of diversified educational provision, streams and routes can be differentiated according to the length of study, baccalaureate passes and the number of repeats.

Baccalaureate streams and conditions of access to the final class of the lycée

The routes leading to the various types of baccalaureate can be differentiated first of all by the minimum length of time at school required to prepare for the baccalaureate. Therefore, bearing in mind that the minimum length of time (i.e. with no repeats) required to take the general or technological baccalaureate is seven years and the vocational baccalaureate eight years, we can calculate statistics differentiating between those students who have reached terminale 'on time' and those having had to repeat at least one class in the course of their secondary school careers. This exercise shows that more than 70 % of students in the general stream reach the final class 'on time', just over a quarter get there after eight years, with only a minute proportion taking longer. Students in the general stream showed marked

Insert 1

The data: student panel and family survey

Our main data source is the panel of students entering the first year of secondary education (6th class) in 1989, followed throughout their school careers at lower secondary (collège) school and subsequently at the (general, technological or vocational) lycée. These data, compiled by the Directorate for Planning and Development (DPD) of the Ministry of Education, have recently been analysed in a study by Caille and Lemaire (2003). The data comprise socio-demographic information (nationality, parents' qualifications, etc.) on 24 710 persons over a period of ten years. In the following, we are only concerned with those students who reached the final year of the lycée leading to the baccalaureate (terminale), i.e. 60.4 % of the cohort. The highest number of students is to be found in the general baccalaureate stream (34 % of the total cohort entering secondary school and 56.3 % of those who reach baccalaureate level, whether or not they actually pass), followed by the technological baccalaureate stream (17.6 % and 29.2 % respectively), and finally the vocational baccalaureate stream (8.7 % and 14.4 %). The vocational baccalaureate, the most recently introduced stream, is less important, especially for this generation, because these youngsters had the opportunity of transferring to the technological stream via 'bridging classes' (almost 15 % of those taking the technological baccalaureate took this route). These panel data were matched with data from the complementary family survey conducted by the Ministry of Education in 1991. This survey, which has an 80 % response rate, has the advantage of supplementing the panel data with information on family background (parents and school careers of siblings), primary education routes, parents' aspirations for the education of their children, reasons for the choice of school, etc. Matching the data from this survey with the sub-population of successful baccalaureate candidates results in a sample of 9 114 students.

differences from the two other streams. Thirty-one percent of students in the vocational stream reach the final class 'on time' (eight years), whereas approximately 50 % take nine years and 18 % ten years. In the technological stream, just over one quarter of students reach the final class on time, some 70 % take eight years, the rest ten years. Although those taking the technological baccalaureate reach the final class on time less frequently than those taking the vocational baccalaureate, very few of them arrive very late (5 % take ten years, compared to 18 % for the vocational baccalaureate).

A second differentiating factor is the pass rate. Pass rates (defined here as the ratio of students actually awarded the baccalaureate to the number of students reaching the final class) differ very considerably from one stream to another, ranging from 65.7 % for the vocational baccalaureate to 75.9 % in the technological stream and 92.7 % in the general stream. Therefore, regardless of the time taken by students to reach the baccalaureate, the relative proportions of the three types of stream within the total number of baccalaureate holders is even more unbalanced than it is when compared with the proportion of students reaching the final class: the proportion of those taking the general baccalaureate then stands at 62.4 %, while the proportion of the technological/vocational baccalaureate candidates falls to 26.3 % and 11.3 % respectively. These gaps are the re-



sult of a social construction. In effect, the assessment criteria applied in the examination are structurally more in tune with those originally characteristic of the general stream, which are also applied - admittedly with certain adaptations - in the technological and vocational streams to ascertain a student's aptitude to meet the academic requirements of the baccalaureate. One of the major differences between the French vocational education system and the dual system in Germany is precisely the fact that examination failure rates are higher in France, in particular due to the greater importance accorded to general subjects, systematically valued as such (Möbus and Verdier, 1997).

The spread between the three streams is even more marked when we look at the proportion of students having repeated a year in lower secondary school: 8.1 % in the case of the general baccalaureate, 38.9 % for the technological baccalaureate group and 51.9 % for the vocational baccalaureate. This means that lower secondary school repeaters represent 85.4 % of vocational baccalaureate holders who did not reach terminale 'on time', compared to 54.9 % for the technological baccalaureate and 23.4 % among those taking the general baccalaureate. The 'latecomers' in the general stream have therefore essentially repeated a year at the lycée. In fact this holds true for more than three-quarters of this group. Almost 30 % repeated the seconde (first year of upper secondary, age 15-16) - mainly voluntary repeats to enable the students to transfer to the stream of their choice, generally towards the more prestigious scientific streams (Coeffic, 1998). This implies that the extension of the marginal length of schooling may reflect both a requirement of the education system and a deliberate choice: the stigmatisation of school failure on the one hand, or the desire to optimise one's educational capital on the other. This dichotomy, which fuels doubts as to the effectiveness of repeats (Paul, 1994), seems very far removed from the Scandinavian model of the educational route which limits repeats to an extreme minimum.

Routes and differentiation of educational streams

The different routes of each of the streams can be typified on the basis of these various characteristics. In the general stream, the main distinction is evidently between those reaching the baccalaureate 'on time' and the

remainder of the group. Secondly, among the 'latecomers' we can distinguish repeaters in the first year of upper secondary level, only 30.6 % of whom repeated in the second or final years of upper secondary, whereas 42.6 % of lower secondary repeaters spend an additional year in upper secondary level, which tends to confirm that some of these repeats are voluntary.

As in the case of the general baccalaureate, the main distinction within the technological baccalaureate group is whether or not students reach the final class on time. It must be added that almost one half of lower secondary repeaters spend an extra year in the second cycle. It is particularly interesting to note that only 4 % of technological baccalaureate candidates having transferred from the vocational stream via bridging classes, i.e. 15.4 % of the flow, repeat the final year, compared to 9.3 % among their peers as a whole. This suggests that this access route is probably more selective than the technological stream in general. This is the reverse of the phenomenon highlighted by many authors. Duru-Bellat (2002) in particular points out that as a result of guidance given at the end of lower secondary school vocational lycées received students whose educational performance could very well have won them a place at a general or technological lycée if their parents, generally from working class backgrounds, had so wished. Finally, in the case of vocational baccalaureate, the distinctions evidently stem partly from the choice of vocational specialisation (electrical engineering/secretarial/accounting, etc.), which is not taken into account in this article in considering educational routes based on length. However, it is in comparison with the other two more prestigious streams that the characteristics of the routes of vocational baccalaureate holders become apparent.

More specifically, on the basis of the identification of 48 possible pathways, 14 different routes leading to the baccalaureate can be identified as the most representative in terms of their numbers, (i.e. 10 450 students; this flow is matched against the data from the family survey, giving a final total of 9 114 subjects).

The structure of a route and the fact that a student opts for one route as opposed to another is evidentially not a coincidence. In the following, we try to shed some light on the social significance of length of study and



The main routes leading to the various baccalaureates							Table 1
Educational routes (duration and pathway)	No	Percentage of those reaching the relevant baccalaureate	Percentage of the cohort	Higher education	Exits from the education system	Other	
GENERAL BACCALAUREATE							
7 years, general low. sec. stream, 2 nd year of general upper sec.	5 020	59.7	20.3	98.8	1	0.2	
8 years, general low. sec. stream, repeats in 2 nd year of upper sec.	408	4.8	1.6	97.8	2	0.2	
8 years, general low. sec. stream, repeats in 1 st year of upper sec.	534	6.3	2.2	96.6	3.4		
8 years, general low. sec. stream, repeats at lower secondary level	333	3.9	1.3	97.6	2.1	0.3	
8 years, general low. sec. stream, 2 nd year of general upper sec., baccalaureate repeats	682	8.1	2.8	95.2	4.2	0.6	
VOCATIONAL BACCALAUREATE							
8 years, general low. sec. stream, 1 st year of upper sec. and final year of upper sec. /brevet d'études professionnelles (BEP - vocational studies diploma), 2 nd year of upper sec. vocational baccalaureate	429	19.9	1.7	31.5	63.6	4.9	
9 years, general lower sec. stream with repeats, 1 st year of upper sec. and final year of upper sec. /brevet d'études professionnelles (BEP - vocational studies diploma), 2 nd year of upper sec., vocational baccalaureate	466	21.6	1.9	37.1	62.2	0.6	
TECHNOLOGICAL BACCALAUREATE							
7 years, general low. sec. stream, 2 nd year of upper sec., technological baccalaureate	901	20.7	3.6	96.7	2.4	0.9	
8 years, general low. sec. stream, repeats in 1 st year of upper sec.	509	11.7	2.1	93.1	5.3	1.6	
8 years, general low. sec. stream, repeats in lower secondary	520	11.9	2.1	92.1	7.3	0.6	
8 years, general low. sec. stream, 1 st year of upper sec. and final year of upper sec., brevet d'études professionnelles (BEP - vocational studies diploma), 2 nd year of upper sec., technological baccalaureate	196	4.5	0.8	86.7	11.2	2	
9 years, general low. sec. stream with repeats, 1 st year of upper sec. and final year of upper sec., brevet d'études professionnelles (BEP - vocational studies diploma), 2 nd year of upper sec., technological baccalaureate	197	4.5	0.8	83.8	16.2		
9 years, general low. sec. stream with repeats, repeats in 1 st year of upper sec.	149	3.4	0.6	90.6	9.4		
8 years, general low. sec. stream, 1 st year of general or technological upper sec., 2 nd year of technological upper sec., baccalaureate repeats	106	2.4	0.4	86	12.2	1.9	

Source: DPD Panel 1989, processed by LEST

routes which are the farthest removed from the ideal norm: award of a general baccalaureate within a period of seven years.

Equality of opportunities at school and social inequalities: factors of exclusion from the educational norm

In France, the massive expansion of the education system, in particular as regards access to the baccalaureate and higher education, is inseparable from the internal diversification of the education system itself.

This raises the question of the actual scope of this 'democratisation'. In the following, this scope is examined in the field of secondary education with reference to an implicit norm for the assessment of students' educational success.

The growing diversity of educational routes and the norm of success

As reflected in the principal objectives assigned to schools, namely 'to impart knowledge and culture, prepare students for oc-



The determinants of the general baccalaureate route compared to all the other routes. A simple probit model **Table 2**

	Coeff.	t-ratio	Marginal effect
Constant	-0.389902	-2.71535	-0.155
Male	-0.258584	-8.33352	-0.102
Nationality	-0.198982	-2.65645	-0.079
Who is responsible for the child?			
Both parents	0.248897	4.76509	0.099
Others	Ref.		
Father's highest formal qualification			
No formal qualification	-0.187527	-2.22128	-0.074
Certificate of primary education	-0.38228	-5.13804	-0.152
Certificate of lower secondary education	-0.303204	-3.81058	-0.120
<i>Certificat d'aptitude professionnelle</i> (CAP - vocational aptitude certificate)/ <i>brevet d'études professionnelles</i> (BEP - vocational studies diploma)	-0.256226	-4.03521	-0.102
Baccalaureate/upper secondary technical certificate (BT)	-0.120269	-1.89999	-0.047
1 st cycle	-0.163849	-2.36074	-0.065
Unknown	-0.187186	-2.55474	-0.074
2 nd and 3 rd cycles	Re.		
Mother's highest formal qualification			
No formal qualification	-0.691037	-8.15868	-0.275
Certificate of primary education	-0.619258	-8.27866	-0.246
Certificate of lower secondary education	-0.444773	-5.98584	-0.177
<i>Certificat d'aptitude professionnelle</i> (CAP - vocational aptitude certificate)/ <i>brevet d'études professionnelles</i> (BEP - vocational studies diploma)	-0.515311	-7.55312	-0.205
Baccalaureate/upper secondary technical certificate (BT)	-0.29305	-4.35304	-0.116
1 st cycle	-0.18338	-2.63334	-0.073
Unknown	-0.561111	-6.56021	-0.223
2 nd and 3 rd cycles	Ref.		
Socio-occupational category			
Farmers	0.178236	1.96727	0.070
Crafts and trade	0.0816805	1.41555	0.032
Teachers	0.151191	2.10701	0.060
Middle-level occupations	0.0222823	0.409733	0.008
Employees	-0.00572202	-0.0878131	-0.002
Skilled workers	-0.11809	-1.90386	-0.047
Unskilled workers	-0.142763	-1.69332	-0.056
Unknown	0.0284167	0.208038	0.011
Management	Ref.		
Standard of written French when entering secondary school			
Good	0.788371	13.6276	0.313
Average	0.334818	5.9275	0.133
Below average, unsatisfactory	Ref.		
Level of maths when entering secondary school			
Good	0.56336	8.06221	0.224
Average	0.114624	1.62581	0.045
Below average, unsatisfactory	Ref.		
Does the child have his/her own room?			
No	-0.0806567	-2.01792	-0.032
Yes	Re.		

Cont. page 59

cupational life, educate the citizen to contribute to the construction of the identity of their country' (Thélot, 1994), equality of opportunity is a leading concern of the French education system.

There has indeed been a marked reduction in inequalities over the last two decades in terms of rates of access to education of the various social categories (an annual average of 3 %, according to Joutard and Thélot, 1999, p. 73). The significant expansion of educational provision during the decade from 1985 to 1995 triggered a marked reduction in social inequalities in terms of gross access rates. For example, since 1984, the likelihood of working-class children going on to higher education increased by a factor of 3.5 compared to an overall average of 2.2 (Ministry of Education, 2000). The nature of this 'democratisation' process has nevertheless been called into question by many authors. It has been described as both 'segregative', (Merle, 2000), 'uniform' (Goux and Maurin, 1997) or even 'demographisation' (Prost, 1992) in so far as the increase in the rates of schooling per age accentuate the gaps between the different streams in terms of their social recruitment (!).

Without going into the details of this debate (see in particular Duru-Bellat and Kieffer, 2000), one aspect of this particularly high growth of educational provision in France should nevertheless be underlined: the high degree of complexity which characterises the initial education system. This complexity gives rise to the following question: what is the point of offering increasingly diversified provision and possible routes (see above) to young people and their families, if the same vocational integration opportunities and career prospects are not opened up downstream for students with formally equal levels of education? A number of authors, notably Joutard and Thélot (1999), have even gone as far as to qualify this diversification as 'opaque' and as 'potentially a factor increasing social inequalities at school' (ibid.), as not all families have the same insight into the intricacies of the system.

One of the methods which can be used to isolate the effect of this institutional aspect is to model the distribution of individuals according to the possible routes leading to the baccalaureate and to examine the probability of individuals being assigned to these routes as a function of individual and fam-



ily indicators alone. With educational routes being increasingly diverse, it is increasingly problematic to measure social gaps on the basis of a homogeneous indicator, e.g. educational level or the highest qualification attained (Duru-Bellat, 2002). The criterion 'a pass in the baccalaureate' must therefore be treated with caution if the route used by the individuals to get there is not taken into account. Therefore, in order to identify the processes contributing to educational inequalities - and conscious of the risk of normativity - the award of the general baccalaureate within a period of seven years is set as the reference route. Indeed, in a context of broad access to education, this factor proves to be highly discriminatory for all the players within the education system.

Family structure, student performance and the chances of reaching the general baccalaureate 'on time'

The following results stem from a simple probit model which compares the award of a general baccalaureate to all the other routes. In the following, we focus on the impact of individual and family indicators and how they explain why a student is or is not in the 'norm' (award of the general baccalaureate in seven years). Examination of the marginal effects of the model (shown in Table 2 below) clearly reveals the extent to which the underlying process of social selection operates to assign a student to the norm or not.

Irrespective of gender and nationality, the probability of a student reaching the general baccalaureate within a period of seven years is highest when both parents are responsible for their child's schooling, have a high level of educational attainment (2nd or 3rd cycle), are from academic socio-occupational categories (teachers, management) or are in principle highly motivated to ensure that their children end up working under better conditions than their own (farmers). Students' chances of reaching the general baccalaureate 'on time' improve if their parents choose their school on the basis of its reputation, offer them good living conditions (a room of their own), have other children showing no educational failure (i.e. children are not at a vocational lycée and have not dropped out of or interrupted their education) or have children in higher education. It is also important to stress that the parents' value judgement concern-

The determinants of the general baccalaureate route compared to all the other routes. A simple probit model

	Coeff.	t-ratio	Marginal effect
Repeats at primary school?			
Yes	-0.522249	-7.92021	-0.207
No	Ref.		
Reason for the choice of school			
Good reputation	0.0815123	2.41123	0.032
Practical, etc.	Ref.		
Parental support with schoolwork?			
Yes, because of difficulties	-0.625603	-14.3972	-0.249
No, no need	0.273852	7.40647	0.109
No support	-0.216013	-4.35604	-0.086
Yes, even if no assistance is required	Ref.		
Meeting with teachers upon the initiative of the parents?			
No	0.21755	6.38774	0.086
Yes	Ref.		
Number of siblings at a vocational lycée			
At least one	-0.194581	-2.85865	-0.077
None	Ref.		
Number of siblings in higher education			
None	-0.0946997	-1.72764	-0.037
At least one	Ref.		
Number of siblings having completed or interrupted their education			
At least one	-0.133352	-1.19409	-0.053
None	Ref.		
Final qualification regarded as an advantage for access to employment			
Diploma of higher education	0.207527	5.56564	0.082
Lower-level qualifications	Ref.		
Number of persons 9 114; - logV = 4 711.1 DPD panel cohort (1989 lower secondary school entrants), matched against family survey data.			

ing the most useful qualification to find a job helps to explain why a student obtains a general baccalaureate in seven years or not: this probability rises when a diploma of higher education is named.

These results offer fairly convincing evidence that the route designated as the reference route is related to the most advantaged social and family backgrounds. Access to this norm of educational success is largely subject to social selection. Over and above this very general conclusion, examination of a number of specific variables also merits our attention.

As far as gender is concerned, the spectacular rise in educational levels among girls means that they are more likely to be in the reference route than boys. In fact, girls seem to take the strategic component of educational investment much more seriously than their male peers. This form of rationality is probably due to the higher value they attribute to educational performance under conditions in which the increase in female

(¹) Whereas almost 70 % of young people reach level IV (baccalaureate) and more than 50 % go on to higher education, they do so via different streams: 42 % of students in the two-year STS technical programmes come from working class/employee backgrounds, whereas 14 % are children of upper-level management and liberal professions; in courses preparing students for the prestigious Grandes Écoles, the corresponding percentages are 15 % and 51 % respectively (Ministry of Education. L'État de l'École, 2000, p. 57).



education was coincidental with an increasing number of their mothers going out to work. For girls, being within the reference route therefore seems to imply entry into higher education, opening up a career which makes it easier for them to balance work and family life (Duru-Bellat, 2002).

With regard to educational criteria, students' educational performance can be identified in various ways: by their marks as they enter secondary school, repeats at primary level or difficulties with school work indicated by parents when asked what support they give their children. This appreciation of a student's aptitude constitutes a relatively discriminating factor for their inclusion in the reference route. This means that good marks in written French and maths at the point of entry into secondary school will clearly increase the probability of the student following the 'ideal' route.

Family plans against the educational norm: a bivariate probit model analysis

In terms of education, family plans are based on aspirations which are in themselves set within a framework in which social and institutional logics operate. Their effects on educational tracks can be analysed using a bivariate probit model. The results show such a high level of tension between the aspirations of parents and the opportunities offered to their children that the structuring of the individual tracks has led to the use of the term 'social cynicism'.

Social reproduction, family aspirations and educational demand: some aspects of this issue

With the persistent predominance of the theories of social reproduction by schools, educational sociology in France has long tended to impose an 'implacable vision' of the social inequalities of school careers' (Duru-Bellat, 2002). Under this assumption, the apparent choice of families and students is no more than a form of internalisation of the reproductory logics transmitted by the functioning of schools (Bourdieu and Passeron, 1970). Without intending to call into question these assumptions as a whole - which would in fact be in contradiction to the considerations on inequalities above and, in particular, the fact that inequalities in educational success are derived at a very early

stage from the support of the family, which is very unequal in social terms - it is nevertheless necessary to take into account the logic of increasingly diversified players, measured against the growing complexity of the education system.

New forms of social differentiation are constructed at each key stage in an educational career on the basis of the ability to anticipate the continuation of the educational path and, ultimately, labour market integration. It is a well-known fact that the choice among options (e.g. modern or ancient languages) reflects increasingly sophisticated strategies of distinction, both at compulsory and post-compulsory levels. These play an even more crucial role for some families as it makes it easier for them to circumvent the rules stipulating that parents have to enrol their children in schools in their own neighbourhood so that they can send their offspring to schools with a supposedly better reputation and level of social recruitment (Van Zanten, 2001). It should be emphasised that this practice is not only to be found in the case of the most prestigious lycées in the general educational stream; it also plays a role in the choice between schools in the vocational stream, which has a low social standing (Bell, 1996).

It is therefore indispensable to examine how students and their families take advantage of the educational opportunities offered by the State over and above compulsory schooling. It is also necessary to identify the variable which purportedly translates educational demand. This in itself poses complex problems in so far as inequalities in this field relate to both educational quality and length of schooling (Lemelin, 1998, p. 489). Although certain studies reduce educational demand to a single indicator, such as the intention to continue in education (Houle and Ouellet, 1982) or the last year of a course (Baril et al., 1987), others simultaneously consider the demand for access to a stream, admission, enrolment and finally the award of the final certificate (Myerski and Wise, 1983). Choice of stream and educational routes can easily be added to these factors.

It was the latter viewpoint which we examined more closely in this context, although the panel data do not strictly speaking allow the construction of a variable representative of individual educational demand.



In order to do so, we adopted an approach accounting for family aspirations and educational routes simultaneously.

Norm of educational excellence: family aspirations and ‘social cynicism’

The overall effect of a variable can be broken down on the basis of the marginal effects calculated in our example to differentiate between its direct effect on the probability of a subject being in the norm, as a function of whether their parents regard a diploma of higher education as an advantage, and the indirect effect of this variable when it is present in the equation explaining this judgement. In other words, in Table 3 the overall marginal effect of a variable is by definition the sum of its two values shown in the first (direct effect) and second columns (indirect effect).

More specifically, it is a question of examining the values and signs of the direct and indirect marginal effects. The most striking aspect from this angle is the opposite effect of the attributes of the variable ‘father’s qualification’ (or socio-occupational category) on the probability of the subject gaining the general baccalaureate ‘on time’ (direct effect) and the variable which considers higher education as the best strategy for finding employment (indirect effect). In most cases, the direct and indirect marginal effects of these variables have opposite signs. To be more precise, a father who has no formal qualification, certificate of primary education or is an unskilled worker, who aspires towards the ‘ideal’ route for his child more so than fathers in the other categories (the marginal effects being positive and showing the highest values), cannot halt the ‘social determinism’ mechanism (the marginal effects of the attributes of the father’s qualification and social background are negative and sometimes among the highest in absolute terms within the equation relating to a general baccalaureate pass in a period of seven years).

If the aspirations of working class parents or those with a low level of formal education reduce the possible impact of their social category on their child’s failure, the fact nevertheless remains that a less advantaged social background over-determines students’ educational fate; the overall marginal effects remain negative and are the highest for these categories. In view of the

Insert 2

Bivariate Probit: methodological elements with a view to identifying the direct and indirect marginal effects of family aspirations

Following on from the discussion above, our assumption is that family aspirations (identified here as the qualification regarded as an advantage for access to employment) and the type of route leading to the baccalaureate are partly correlated. In order to correctly identify the parameters of their respective explanatory variables, a statistical framework is defined which includes a joint model taking account of the correlation between their terms of error rates. In so far as the route and aspirations are qualitative variables, this model may take the form of a bivariate probit model, under the hypothesis that the non-observable factors follow a normal law. Assuming that the first equation explains the probability of students obtaining the baccalaureate ‘on time’ and that the second equation explains the probability of parents regarding a diploma of higher education as an advantage, we can plot the following equation:

$$y^*_1 = \beta'_1 x_1 + \varepsilon_1, y_1 = 1 \text{ if } y^*_1 > 0, 0 \text{ or}$$

$$y^*_2 = \beta'_2 x_2 + \varepsilon_2, y_2 = 1 \text{ if } y^*_2 > 0, 0 \text{ or,}$$

whereby x_1, x_2 are the two sub-sets of the explanatory variables which may have elements in common.

Assuming that the residuals follow a normal bivariate law $(0,0,1,1,\rho)$, this model is a bivariate probit model with $\Phi=(x_1, x_2, \rho)$ as its distribution function and $\varphi(x_1, x_2, \rho)$ as its density function. To formulate the distribution function, we use the following equations:

$$Q_{i1} = 2y_{i1} - 1 \text{ and } Q_{i2} = 2y_{i2} - 1, z_{ij} = \beta'_j x_{ij},$$

$$w_{ij} = Q_{ij} z_{ij}, j=1,2 \text{ and } \rho^*_i = Q_{i1} * Q_{i2} * \rho.$$

The probability factors which serve to calculate probability therefore take the following form:

$$\text{Prob}(Y_1=y_{11}, Y_2=y_{12}) = \Phi(w_{i1}, w_{i2}, \rho^*_i). \tag{1}$$

The log-probability may therefore be expressed as follows:

$$\text{Log } L = \sum_{i=1}^n \Phi(w_{i1}, w_{i2}, \rho^*_i). \tag{2}$$

A whole series of marginal effects may be drawn from this specification (Greene, 2000, 1998) which may be of direct interest to us here. We now plot $x = x_1 \cup x_2$ and $\beta'_1 x_1 = \gamma'_1 x$, underlining that γ_1 contains all the non-nil parameters of $\beta_1; \gamma_2$ is defined in the same way. These conditions show a bivariate probability of:

$$\text{Prob } [y_1=1, y_2=1] = \Phi[\gamma'_1 x, \gamma'_2 x, \rho] \tag{3}$$

These same probabilities may evidently be calculated for the other combinations of the attributes of y . In the following, these marginal effects are calculated on the basis of the conditional hope: ‘a pass in the general baccalaureate in seven years/diploma regarded by the parents as an advantage for access to employment’, whereby the attribute selected is a diploma of higher education.

This conditional hope can in fact be expressed as follows:

$$E(y_1/y_2=1, x) = \text{Prob}(y_1=1/y_2=1, x) = \text{Prob}(y_1=1, y_2=1/x) = \int \Phi[\gamma'_1 x, \gamma'_2 x, \rho] / \Phi(\gamma'_2 x) \tag{4}$$

The marginal effects of both a discrete and a continuous variable can be identified on this basis. And in both cases this marginal effect can be broken down to differentiate between a ‘direct effect’, linked to the variability of the probability due to the presence of the variable in the first equation, and an ‘indirect effect’, via the presence of this variable among the explanatory variables of the second equation. The marginal effects are calculated on the basis of the estimation of this model (cf. Table 3).

positively correlated factors of non-observed heterogeneity and the low impact of the aspirations of the least advantaged families, it can be postulated that the diversification of streams and broad access to education do not translate into qualitative democratisation; on the contrary, the aspirations of less advantaged families are confronted with a degree of ‘cynicism’ of social selection.



Low internalisation of educational difficulties?

In actual fact, even if primary-level repeats seem to be a factor distancing students from the norm (negative marginal effect), families do not regard this as an insurmountable handicap in the longer term. This initial failure does not prevent families from regarding higher education as an advantage for their child (positive marginal effect, Table 3). Given the opposite signs of their marginal effects in the two equations, the same can be said for the effect of the scores in maths and French as students enter secondary school. Poor or mediocre results seem to play in favour of greater value being attached to a higher-level diploma as a means of gaining access to employment, as if the internalisation of the child's difficulties resulted in an over-estimation of the importance of the educational level in the probable vocational pathway of the latter. The same logic seems to be at work as far as parental support with schoolwork is concerned.

Learning effects among siblings

The family seeks to avoid a repetition of the poor choice of educational orientation made for siblings. Having already had children at a vocational lycée acts as an incentive for parents to revise their aspirations (the marginal effect of this attribute on the probability of regarding higher education as an advantage is positive). The experience of having other children at a vocational lycée makes parents revise their evaluation of the school's role; they see higher education as the best means of successful social and occupational integration.

With this perception of the role of higher education, which is no doubt transmitted to their offspring, these parents help the child approach the 'ideal' norm, i.e. a 'flawless' route up to the general baccalaureate (whereas the direct marginal effect of the attribute 'at least one child at vocational lycée' on the general baccalaureate is '- 0.0812', the overall effect is only '- 0.078' as a result of the positive indirect marginal effect of the attribute '0.0025' on the probability of regarding a diploma of higher education as an advantage). In contrast, the presence in the family of siblings who have left the education system seems to suggest that parents underestimate the role that long education-

Marginal effects on the basis of the variation of conditional hope		Table 3
	Effect on the access to the general baccalaureate in 7 years: direct effect	Effect of the diploma regarded as an advantage: indirect effect
Constant	-0.776	-0.314
Male	-0.1032	-
French	-0.0791	-
Who is responsible for the child?		
Both parents	0.0988	-
Others	Ref.	
Father's highest formal qualification		
No formal qualification	-0.0886	0.0132
Certificate of primary education	-0.1663	0.0137
Certificate of lower secondary education	-0.1270	0.0077
<i>Certificat d'aptitude professionnelle</i> (CAP - vocational aptitude certificate)/ <i>brevet d'études professionnelles</i> (BEP - vocational studies diploma)	-0.1102	0.0093
Baccalaureate/upper secondary technical certificate (BT)	-0.0508	0.0043
1 st cycle	-0.0650	0
Unknown	-0.0880	0.0132
2 nd and 3 rd cycles	Ref.	
Socio-occupational category of the responsible adult		
Farmers	0.0631	0.0073
Crafts and trades	0.0279	0.0035
Teachers	0.0599	0.0006
Middle-level occupations	0.0083	0.0012
Employees	-0.0092	0.0065
Skilled workers	-0.0560	0.0078
Unskilled workers	-0.0699	0.0104
Unknown	-0.0033	0.0116
Management	Ref.	
Standard of written French when entering secondary school		
Good	0.3168	-0.0023
Average	0.1328	0.0005
Below average, unsatisfactory	Ref.	
Level in maths when entering secondary school		
Good	0.2316	-0.0053
Average	0.0507	-0.0035
Below average, unsatisfactory		
Does the child have his/her own room?		
No	-0.0346	0.0019
Yes	Ref.	
Repeats at primary school?		
Yes	-0.2159	0.0057
No	Ref.	
Reasons for the choice of school		
Good reputation	0.0374	-0.0044
Practical	Ref.	
Support with schoolwork?		
Yes, because of difficulties	-0.2531	0.0033
No, no need	0.1078	0.0013
No support	-0.0924	0.0051
Yes, even if no assistance is required		
Meeting with teachers on the initiatives of the parents?		
No	0.0855	0.0011
Yes	Ref.	

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al streams may play in working life. Inter-mingling with siblings who are no longer at school and the lack of importance attributed to school by the responsible members of the family are factors significantly contributing to the distancing of these students from the norm (both marginal effects are negative).

Conclusion

Among the results presented in this article, the most striking are undoubtedly those related to the power of family social aspirations with respect to higher education:

- all other things being equal, early educational failure makes families attach greater importance to success in higher education as a means of access to employment;
- a sibling having gone through the vocational education stream triggers the same type of effect on family aspirations.

These results, which may at first sight seem surprising, illustrate that difficulties in terms of school results or earlier orientation do not play a demotivating role, but rather tend to lead to an even stronger internalisation of the 'norms of excellence' of the education system. The results are clear evidence that while the baccalaureate has effectively become an inescapable social norm, it is to a certain extent secondary to a collective internal norm within the French education system, i.e. a pass in the general baccalaureate 'on time' (within a period of seven years).

This complex interplay between a general norm and a logic of internal functioning (see Méhaut, 1997) poses obvious problems of social justice. In accordance with contractualist theories of justice (Trannoy, 1999), if holding the baccalaureate and the related knowledge become the shared social objective, a principle of compensation of differences (the search for homogeneity) should come into play, as opposed to a principle of natural reward for personal talent (the logic of differentiation). The effectiveness of the former principle calls for stronger collective investment in the 'less talented' with equal effort (beyond the threshold, the responsibility of each individual and, therefore, the principle of natural reward prevails). To a certain extent - and this is the entire paradox of the French situation - there is a general consent to such collective investment, since the length of schooling is

Marginal effects on the basis of the variation of conditional hope			Table 3
	Effect on the access to the general baccalaureate in 7 years: direct effect	Effect of the diploma regarded as an advantage: indirect effect	
Number of siblings at a vocational lycée			
At least one	-0.0812	0.0025	
None	Ref.		
Number of siblings in higher education			
None	-0.0455	0.0078	
At least one	Ref.		
Number of siblings who have completed or interrupted their education			
At least one	-0.0486	-0.0032	
None	Ref.		
Number of individuals: 9 114 ; -logV=9212.34. DPD panel cohort (1989 lower secondary school entrants), matched against family survey data.			

the longest among students with educational difficulties who have had to repeat one or more years and therefore reach the baccalaureate at a very late age. However, in view of the social selectivity of the different routes, these investments tend to be stigmatising factors rather than positive signals. This is a clear illustration of the individual and collective risks of segmentation into diversified routes matched against a collective internal benchmark within the education system (passing the general baccalaureate on time), which is substantially more powerful than the formally homogenising social norm, i.e. a pass in the baccalaureate. These conclusions are in line with the already familiar results in terms of segregative democratisation.

Nevertheless, given the diversification of institutional provision and despite factors of social inertia which are certain to play a considerable role, individuals (students and families) tend to make choices driven by their aspirations and their future expectations (Boudon, 1979). The routes examined here must therefore be seen as the result of these interactions between social and institutional structures and the judgements made by individuals. Without going as far as to take account of a logic of subjectivation as a component of educational experience (Dubet, 1994), it must be recognised that this approach, for the time being, is subject to the limit that we have as yet no recourse to the aspirations expressed by students and their families as they come out of the final year of lower secondary or on routes within higher education.



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Key words

Vocational education,
social sorting,
educational investment,
drop out,
higher education,
youth integration.

Europe International

Information, comparative studies

Adult education and lifelong learning / Peter Jarvis.

3rd ed.

London: Routledge Falmer, 2004, 392 p.
ISBN 0 415 31493 3

In this new edition the author has made extensive revisions and included substantial additional material to take account of the many changes that have occurred in the field of adult education. Additional and updated material in this much-anticipated new edition includes: a discussion on both globalisation and Europeanisation, indicating the pressure to change exerted on the educational system; a greater emphasis on lifelong education, lifelong learning and society; an extended discussion on the theorists of distance education and introductory material on e-learning and on-line learning; an updated look at changes in UK policy and European policy documents; new material on the relationship between research, learning and the changing approaches to knowledge, with more emphasis placed on action learning and research. Students of education for adults will find this an invaluable course companion, while practitioners and researchers in adult and lifelong learning will find this edition even more interesting than the last.

Allgemeinbildung und Berufsbildung: Konkurrenz und Kongruenz der Konzepte im Europa des 20. Jahrhunderts / Elmar Lechner und Franz Pöggeler (Hrsg.). [General education and vocational training: competition and congruence of the concepts in 20th century Europe].

Frankfurt: Peter Lang Verlag, 2004, 509 p.
(Bildungsgeschichte und Europäische Identität, 4)

ISBN 3-631-50940-5

ISSN 0941-0147

The fourth volume of the series 'Education history and European identity' continues the work on establishing a history of European education. The international team of training researchers examined the relationship between principles of general education and those of vocational education in the 20th

century in different European countries: Italy, Sweden, Belgium, Slovenia, Switzerland, Austria, Poland, Slovak Republic, Germany, Netherlands, Yugoslavia, Greece, Estonia, Ukraine; Bulgaria, United Kingdom, France. The contributions are in English or German.

Alternative mechanisms to encourage individual contributions to vocational education and training / Sandra Haukka et al.

National Centre for Vocational Education Research - NCVER

Adelaide: NCVER, 2005, 70 p.

ISBN 1-920896-23-6

Financing vocational education and training, as part of Australia's commitment to lifelong learning, will become a greater challenge as increased spending on other public services, such as health and welfare caused by an ageing population, constrains government education expenditure. This report examines a range of mechanisms to encourage individual contributions to and participation in vocational education, drawing on international examples, and presents available findings about the effectiveness of these mechanisms in Australia. The research suggests learning accounts and paid educational leave offer the most potential. Mechanisms must offer incentives for individuals to invest, preferably in conjunction with incentives for employers, such as taxation breaks and superannuation.

<http://www.ncver.edu.au/research/proj/nr2014.pdf>

Emdel: a model for valorization of eLearning in a knowledge society / ed. by Ellen Gard.

Gard, Ellen

Florence: Tuscany Region - EMDL, 2005, 133 p.

On 1 February 2005 the Directorate-General for Education and Culture's Valorisation Unit hosted the final conference of the EMDL project in Brussels. The project, started in 2001 and financed by the Leonardo da Vinci Programme, was supported by the Tuscany Region (Italy) together with partners from 6 countries. The EMDL project aims to develop a European model for distance learning, based on establishing and disseminating



This section has been prepared by **Anne Waniart**, and the Documentation Service with the help of the members of the European network of reference and expertise (ReferNet).

Reading selection

This section lists the most important and recent publications on developments in training and qualifications at an international and European level. Giving preference to comparative works, it also lists national studies carried out as part of international and European programmes, analyses of the impact of Community action on the Member States and national studies seen from an external perspective.



best practices from existing eLearning products in the partner countries. With an aim to enlarge the EMDEL consortium in order to create a European platform of eLearning providers, the conference provided an opportunity to learn more about the valorisation policy of DG Education and Culture and about the Commission's eLearning policy.

http://www.emdel.org/docs/Emdel_rapport_web.pdf

The dynamics of social exclusion in Europe: comparing Austria, Germany, Greece, Portugal and the UK / Edited by Eleni Apospori.

Cheltenham: Edward Elgar, 2005, 576 p.
ISBN 1 84542 229 5;

Issues of poverty and social exclusion are high on the European policy agenda. This publication reports on findings from a European Commission-funded study which analyses data from the European Community Household Panel and brings a multidimensional approach to international comparisons of poverty and social exclusion. The research, building upon that of the preceding book, *Poverty and Social Exclusion in Europe*, compares four groups expected to be at particular risk of poverty and social exclusion: young adults, single parents, the sick or disabled, and the retired. Following individuals over a twelve-month period, the analysis explores a wide range of indicators of poverty and social exclusion. These include low incomes; lack of household amenities, personal necessities and consumer durables; the extent of social contact with friends and neighbours; and membership in clubs or organisations. The contributors provide not just country-based data, locating empirical findings within national policy, but also cross-national data with implications for supranational policy.

Entrepreneurship research in Europe: outcomes and perspectives/ Edited by Alain Fayolle.

Cheltenham: Edward Elgar, 2005, 384 p.
ISBN 1 84376 599 3

In this important new book, leading international scholars highlight the unique features and rich scope of European research in entrepreneurship. Pursuing several different perspectives, they focus on the key issues and most significant developments in the field. The authors illustrate current con-

cepts in entrepreneurship research and identify important methodological and theoretical questions. They also discuss innovations in European research methods that often result from holistic and systemic approaches as well as from multidisciplinary research. They move on to study entrepreneurship, innovation and culture as a set of interrelated fields, highlighting the role of culture in entrepreneurship. They demonstrate that culture must be understood in a broad sense and at different levels, e.g. as professional, corporate and national culture. The book provides powerful tools to help identify and understand the importance of European cultural roots within the international entrepreneurship landscape.

The European social model: modernisation or evolution? / Nick Adnett.

Cheltenham: Edward Elgar, 2005, 256 p.
ISBN 1 84376 125 4;

This timely book explores the development of the European Social Model and questions whether the relatively high level of social protection provided, both in terms of social welfare provision and in the creation of workers' rights and employment regulation, is sustainable. At the 2000 Lisbon Council the Member States agreed that this model was in need of modernisation if the objective of making Europe the most competitive and dynamic knowledge-based economy in the world was to be achieved. Consequently, this book examines the economic rationale for EU social policy, identifies the main factors promoting reform and assesses the priorities for reform in an enlarged EU beyond 2004.

Globalization and nationalism in education / edited by: David Coulby, Evie Zambeta

Coulby, David; Zambeta, Evie
London: Routledge Falmer, 2005, 304 p.
(World yearbook of education, 2005)
ISBN 0415348587

The volume deals with two major and apparently opposing forces within education and society: globalisation and nationalism. Globalisation is often considered in economic terms - of continued growth of international trade and a concentration of wealth in corporate hands - yet it also encompasses technological, political and cultural change. The World Yearbook of Education 2005 explores the role of the education sector in our glob-



alised knowledge economy and considers its political implications in terms of monopoly and the cultural consequences of homogenisation and Americanisation. The other strand of this study - nationalism - remains a persistent force within education and society in all parts of the world, and this volume examines the extent to which it can fuel conflict at all levels through prejudice and intolerance. Concentrating on the epistemological consequences of nationalism, leading international thinkers examine the extent to which it is reflected in the curricula of schools and universities around the world. Finally, the complex relationship between globalisation and nationalism is explored, and contributors investigate the part that educational institutions and practices play in forming both agendas. A wide range of perspectives are employed, including post-colonial discourse, classical economics and sociological theory.

History of education / ed. by Gary McCulloch; Stephens, Maria.

London: Routledge, 2005, 256 p.
ISBN 0415345707

This lively and informative reader brings together a wide range of material to present an international perspective on topical issues in the history of education. Focusing on enduring trends, it provides broad coverage of the subject, including important topics such as: higher education; informal agencies of education; schooling, the state and local government; education, social change and inequality; curricula; teachers and pupils; education, work and the economy; education and national identity. Emphasising contemporary work on topical issues, this book represents the research and views of some of the most respected authors in the field. Gary McCulloch's introduction places the role of history in the context of the current educational climate. Students of the history of education will find this book an important guide to further reading and understanding.

Internationalizing higher education: critical explorations of pedagogy and policy ed. by Peter Ninnes & Meeri Hellstén. Comparative Education Research Centre - CERC

Dordrecht: Kluwer Academic Publishers, 2005, 231 p.
(CERC studies in comparative education, 16)
ISBN 962-8093-37-1;

One of major components of globalisation is the internationalisation of education. The increasing pace and complexity of global knowledge flows, and the accelerating exchange of educational ideas, practices and policies are important drivers of globalisation. Higher education is a key site for these flows and exchanges. This book casts a critical eye on the internationalisation of higher education. It peels back taken-for-granted practices and beliefs, explores the gaps and silences in current pedagogy and practice and addresses the ambiguities, tensions and contradictions inherent in internationalisation. Scholars from a range of disciplines and regions critically examine the commodification of higher education, teaching and support for international students, international partnerships for aid and trade, and the impact of internationalisation on academic work.

Labour supply and incentives to work in Europe / edited by Ramón Gómez-Salvador

Cheltenham: Edward Elgar, 2005, 424 p.
ISBN 1 84542 129 9

This publication highlights recent developments in the labour supply and gives a detailed assessment of their link with economic policies and labour market institutions. Despite major changes in the European labour supply during the past few decades, the existing literature still lacks a comprehensive study of the link between labour supply and labour market institutions from a macro perspective. The contributors, themselves from a variety of academic disciplines and backgrounds, consider aspects of labour supply such as incentives to work, determinants of labour force participation and new forms of employment relationships. Each original chapter, specially written for this book, is followed by a discussion chapter. The book ends with a valuable panel discussion on labour supply in an enlarged Europe.

Online Educa Berlin 2004: post conference report.

Berlin: ICWE GmbH, 2005, 12 p.
ICWE GmbH, Leibnizstrasse 32, DE-10625 Berlin, URL: <http://www.online-educa.com/en/>

Meeting the networking needs of the international e-learning and distance education industry, the annual Online Educa Berlin conference is the key networking venue for strategists and practitioners from all over the world. Themes for Online Educa Berlin 2004:



Building and implementing eLearning strategies in companies and public sector organisations; Building and maintaining the virtual campus; Effective and efficient eLearning; Creating interactive and collaborative eLearning environments; Managing the eLearning process; Future trends in eLearning technology including the impact of wireless technologies; Improving the quality of eLearning through evaluation, including online assessment and certification; ELearning as a tool for social change.

http://www.online-educa.com/pdf/post_conference_report_2004.pdf

Overeducation in Europe: current issues in theory and policy / edited by Felix Büchel.

Cheltenham: Edward Elgar, 2005, 256 p.
ISBN 1 84376 361 3

Overeducation is one of the most important mechanisms for labour market adjustment when there is an excess supply of highly skilled workers. However, there is much debate about the consequences of this phenomenon, and of its short- and long-term effects for both the overeducated worker and the economy as a whole. This book contributes to our understanding of recent developments in research on overeducation, by providing a detailed overview of pertinent theoretical and policy issues.

Professions, competence and informal learning: the nature of professions and the role of informal learning in acquiring professional competence / Graham Cheetham.

Cheltenham: Edward Elgar, 2005, 352 p.
ISBN 1 84376 408 3

This book takes a fresh look at professions and the nature of professional practice. It offers an innovative model of professional competence and throws new light on the role of informal learning in its acquisition. Based on extensive research undertaken by the authors across 20 professions, the book also offers a taxonomy of informal professional learning methods and suggests a new concept (and related model) of professional development.

Vers une société européenne de la connaissance: la stratégie de Lisbonne (2000-2010) / Maria Joao Rodrigues (ed.)

Brussels: Editions de l'Université de Bruxelles, 2004, 305 p.

The authors broach vital subjects in terms of the future of the European Social Model and governance in Europe. Knowledge is in the process of becoming a fundamental source of economic and social development - but it could also become a source of social inequality and new hierarchies of international power. Is it possible to design a European alternative to the US model of a knowledge-based society? How can international competitiveness and the high-tech revolution be reconciled with the European values of justice, social cohesion and democracy? What modernisation strategy should be adopted for technological innovation, the reform of the welfare state, European employment policies, research, education and the single market? Illuminating responses are given in the book to these highly significant questions for our future.

Vocational education and training through open and distance learning / Louise Moran, Greville Rumble.

London: Routledge, 2004, 256 p.

(World review of distance education and open learning, 5)
ISBN 0415345235

The world needs workers with more and better skills. Conventional apprenticeships and old methods of professional training are not providing enough skilled workers, so governments, companies and colleges are using open and distance learning to fill these gaps. This unique international review draws from worldwide experience of vocational training and distance education. It looks at recent policy and practice at many different levels - from transnational programmes and national policies to institutional and programme models. This volume also provides guidance on how distance education and new technologies can be used to support vocational education and training.



European Union: policies, programmes, participants

Eurobarometer on Lisbon agenda.
European Commission, Directorate General Press and Communication;
 Brussels: EUR-OP, 2005, 165 p.
 (Special Eurobarometer, 215)

To examine the impact of the Lisbon agenda, DG PRESS unit B1 commissioned a wide-ranging Eurobarometer Special Survey in the 25 European Union Member States. Interviews were carried out between 27 October and 29 November 2004 as part of the Eurobarometer 62.1. The method used was that of the standard Eurobarometer surveys of the Directorate-General Press and Communication ('Opinion Polls, Press Reviews, Europe-Direct Unit'). A technical note concerning the way in which the interviews were conducted by the institutes of the TNS Opinion & Social network is annexed to this report. Presenting the main results of the survey, the report analyses all results for the EU25 European average and highlights the differences noted between countries and relevant socio-demographic variables. When necessary, the answers to certain questions have been cross-referenced in order to highlight correlations between respondents' answers.

Last visit to page: 02/2005.

http://europa.eu.int/comm/public_opinion/archives/ebs/ebs_215_en.pdf

Europass.

European Commission, Directorate General for Education and Culture
 European Centre for the Development of Vocational Training - Cedefop
 Brussels: European Commission, 2005

The Europass initiative aims at helping citizens make their skills and qualifications clearly and easily understood throughout Europe. Europass is the name given to a coordinated portfolio of documents, which will improve communication between job applicants and employers across borders, allowing workers to move freely between countries and sectors. Europass consists of five documents: the curriculum vitae (CV), the Europass Language Passport, the Certificate Supplement, the Diploma Supplement and Europass Mobility.

This website is available in English and French. Other language versions will become available soon.

<http://europass.cedefop.eu.int/htm/index.htm>

Europe needs teachers. **European Trade Union Committee for Education - ETUCE**

Brussels: ETUCE, 2005, 6 files

'ETUCE wishes to initiate a campaign in all Member States concerning the quality of the teaching profession and whether there is a shortage or a sufficient amount of teachers in their country. The ETUCE Campaign 'Europe Needs Teachers' held an hearing in Brussels on 17 January with participants from member organisations, the Commission, the European Parliament, the press and social partners. Ján Figel, Commissioner for Education, opened the hearing and stressed that qualified and motivated teachers are a must for the knowledge-based society. The Expert Panel, represented by Arlette Delhaxhe of Eurydice, and Paulo Santiago of the OECD, brought teacher education and the growing need for qualified teachers into focus.'

http://libserver.cedefop.eu.int/vetelib/euorg/ETUCE_2005_0001_en.zip

Implementation of 'Education and Training 2010' work programme: improving education of teachers and trainers: progress report 2004.

Feerick, Seán

European Commission, Directorate General for Education and Culture

Brussels: European Commission, 2004

The development of a common European framework for teacher and trainer skills and qualifications will improve the quality of teacher and trainer education and increase the capacity for innovation, thereby contributing to the Education and Training 2010 priority of increased investment in the development of human resources.

http://libserver.cedefop.eu.int/vetelib/eu/pub/commission/dgeac/2004_0016_en.pdf



Growth and jobs: key documents: education and culture.

European Commission;
Luxembourg: EUR-OP, 2005, website

This selection offers an overview of key documents on the Lisbon strategy. The Lisbon strategy was adopted in March 2000 and aims to make the EU the most dynamic and competitive economy worldwide by 2010. The strategy involves a whole set of policy areas, from research and education to environment and employment.

http://europa.eu.int/growthandjobs/key/education_en.htm

Social dialogue: key documents.

European Commission, Directorate General for Employment and Social Affairs;
Brussels: EUR-OP, 2005, website

The website contains all key documents on Commission publications and communica-

tions, Council / Commission Decisions, Commission consultation documents and recent outcomes of the cross-industry social dialogue.
http://europa.eu.int/comm/employment_social/social_dialogue/docs_en.htm

Social Dialogue texts database: training / lifelong learning.

European Commission, Directorate General for Employment and Social Affairs;
Brussels: EUR-OP, 2005, website

The website contains agreed texts reached between management and labour at European level within the social dialogue process supported by the Commission. These texts present the position of the European social partners on training and continuing training.
http://europa.eu.int/comm/employment_social/dsw/actListThemes.do?themeCode=DOMS06&lang=en

From the Member States

AT **Porträt Weiterbildung Österreich/ Lenz, Werner.**

[Continuing education in Austria: a portrait].

Deutsches Institut für Erwachsenenbildung - DIE

Bielefeld: Bertelsmann Verlag, 2005, 80 p.
ISBN 3-7639-1913-9;

This report by the German Institute for Adult Training (DIE) outlines the history of adult training in Austria, its legal foundations and sources and methods of funding. It provides up-to-date statistical data on continuing vocational training offerings, institutions and personnel. The author provides researchers, students and those employed in continuing vocational training with an overview of the continuing vocational training system in Austria and of foreseeable trends.

BG **Produlzhavashcho profesionalno obuchenie**

[Continuing Vocational Training]

National Statistical Institute - NSI

Sofia: Startprint, 2004, 188 p.

The publication contains three sections: in the first, methodological notes presenting the main goal and tasks, the definitions and classifications used, the object and the scope

of the survey, the structure and the content of the questionnaire, etc.; the second presents analytical notes, including the main survey results on enterprise training policy, training measures and forms of vocational training, participants in continuing vocational training, costs of training, etc. Tables with key statistics are included in the third section, providing a key to vocational training in the country as a whole, as well as data on companies classified according to number of employees, economic activity and type of ownership.

CZ **Czech Republic: Resource dossier / prepared by the Enlargement and South Eastern Europe department in cooperation with the Czech National Observatory of Employment and Training. European Training Foundation - ETF, Enlargement and South Eastern Europe Department; National Observatory of the Czech Republic National Training Fund**
Turin: ETF, 2004, 24 p

The purpose of this dossier is to compile information that would make it easier for ETF know-how and resources to be transferred to Cedefop, in accordance with the agreed exit-entry approach. It contains: a) a list of resources associated with the process of vo-



cational education reform. These are policy and analysis documents on important aspects of the reform process. The materials and documents are classified under three main headings - Employment, Education and Training, and General. b) The dossier also contains a list of contacts and networks. The contacts are classified according to six main categories - Government agencies, development and research agencies, non-governmental organisations, social partners, distance education centres and vocational guidance institutions. c) Also included in the dossier is a list of key websites of agencies involved in the reform process. d) Finally, a chronology highlighting major steps in the reform process has been included in section 5.

http://libserver.cedefop.eu.int/vetelib/nat/cze/gov/2004_0001_en.doc

DE Finanzierung lebenslangen Lernens: der Weg in die Zukunft: die wichtigsten Ergebnisse der Expertenkommission / Bosch, Gerhard. Financing lifelong learning into the future: the expert commission's most significant findings / Bosch, Gerhard.

Duisburg: University Duisburg-Essen, 2005
In: Berufsbildung in Wissenschaft und Praxis (BWP), 6 (2004), p. 5-10

In October 2001 the expert commission on financing lifelong learning, set up by the federal Minister of Education and Research Edelgard Bulmahn by order of the Bundestag, started work on developing a sustainable overall concept for financing lifelong learning. In July 2004 the commission delivered its final report. This article by Prof. Gerhard Bosch summarises its most significant findings and recommendations.

http://www.trainingvillage.gr/etv/HomePages/Front_page_news/BeitragBoschBWP6_04_en.pdf

http://www.trainingvillage.gr/etv/HomePages/Front_page_news/BeitragBoschBWP6_04_.pdf

A portrait of continuing education in Germany / Ekkehard Nuissl, Klaus Pehl. Deutsches Institut für Erwachsenenbildung - DIE

Bielefeld: Bertelsmann Verlag, 2004, 72 p.
3rd ed.
ISBN: 3-7639-1900-7

This third edition of the DIE Portrait of Continuing Education in Germany has been extensively revised to include up-to-date fig-

ures on such key areas as the number of courses offered, participants, institutions, and staff employed. The volume also outlines the history of German adult education and provides information on its legal basis and on funding. Educational researchers, planners, administrators and practitioners will thus obtain a thorough insight into the continuing education system in Germany and into current and future developmental trends.

DK The role of national qualification systems in promoting lifelong learning: country background report - Denmark.

Danish Ministry of Education
Danish Technological Institute
Paris: OECD, 2004, 90 p.

Lifelong learning for all is the guiding framework for OECD's work on learning, both formal and informal. Systemic considerations include foundations, outcomes, access and equity, resources, pathways, visibility and recognition, and policy coordination. The report is divided into three main sections following a common outline provided by the OECD. Section I deals with a description of the Danish qualification system, participation and outcomes. Section II discusses the impact of qualification systems. Section III describes current pressures and initiatives.

<http://www.oecd.org/dataoecd/33/40/34259829.pdf>

EE Education, Labour Market and Career Guidance in Estonia (2004) [Haridus, tööturg ja karjäärinõustamine Eestis].

Elukestva Õppe Arendamise Sihtasutus Innove - INNOVE, Karjäärinõustamise Teabekeskus

Tallinn: Elukestva Õppe Arendamise Sihtasutus Innove, 2004, 74 p.
ISBN 9985-9511-1-5

The aim of this brochure is to provide information about education, labour market and career guidance issues in Estonia. The opening part introduces initial Estonian contact points and public services for further information on any of the main themes. The next two chapters, which discuss education and the labour market in greater detail, are intended to cast light on what are, internationally, the most important issues for guidance practitioners.

http://www.innove.ee/ee/files/karjeristid_ENGs.pdf



ES Las cifras de las educación en España: estadísticas e indicadores: edición 2004 / Ministerio de Educación y Ciencia, Secretaría General Técnica, Oficina de Estadística.

[Education figures in Spain: statistics and indicators. 2004 Edition]

Madrid: Secretaría General Técnica, Subdirección General de Información y Publicaciones, 2004, 382 p.
ISBN 84-369-3874-7

The purpose of this publication is to illustrate the most significant aspects of education in Spain during the academic year 2001-2002. This edition structures the information in a new way. The sections are: the education context, focusing on the geographical, demographic and economic scope; resources allocated to education, analysing the type of education provided by each centre, the human resources, complementary services, spending on education and grants and financial aid; schooling, transition and educational outcomes; teaching, presenting the principal characteristics at each level or in each model of the education system, vocational training, permanent education, etc.; various aspects related to schooling, such as the linguistic models used in teaching, the teaching of foreign languages, religious education and foreign students, the long-term outcomes of education, reflected both in the labour market and in social behaviour; international relations of the education system, indicating education actions conducted abroad, European programmes and equivalence, validation and recognition of foreign qualifications; international statistical indicators, and indicators by Autonomous Community.

FI Aikaisemmin hankitun osaamisen tunnustaminen koulutusjärjestelmässä / Committee on recognition of prior learning in the educational system.

[Recognition of prior learning in the educational system].

Helsinki: OPM, 2004, 64 p.
(Opetusministeriön työryhmämuistioita ja selvityksiä, 27)
ISBN 952-442-805-9

Learning has always taken place outside the official education system as well as within it; people learn in working life, in hobbies, in everyday life. As Finland aims to improve the cost-effectiveness, performance and flex-

ibility of education and training, it has focused its attention on recognising learning acquired outside the school as a major development area for education. EU policies stress the importance of recognising non-formal and informal learning, and the EU has called upon Member States to find ways to formally recognise prior learning.

The Committee on the recognition of prior learning was appointed to define principles governing recognition of general and vocational upper secondary studies, prior studies and other prior learning; to explore ways to give credit for studies or other prior learning applicable to a programme; to explore paths to a more efficient recognition of prior learning for students moving from secondary to higher education; and to propose ways of monitoring recognition of prior learning.

<http://www.minedu.fi/julkaisut/koulutus/2004/tr27/kuvailu.html>

FR Archives et sources pour l'histoire de l'enseignement / sous la dir. Thérèse Charmasson.

Paris: Comité Travaux historiques scientifiques, 2005, 391 p.
ISBN 2-7355-0543-X;

Sources for the history of education are numerous and particularly rich: administrators, archivists, librarians and researchers have all made a point of collecting, classifying and disseminating documents produced over time by actors in the field. This interest has led to special rules being drawn for education archives; to research being conducted on the basis of these sources; to the elaboration of research instruments allowing researchers access to these sources; and to the publication of related articles. Collecting these 11 texts in a single volume aims to make them more widely available to anyone interested in the history of education, especially those embarking on related research.

Vygotski: lectures et perspectives de recherches en éducation / Brossard Michel, Anokhina Olga.

Paris: Pu du Septentrion, 2005, 255 p.
(Education et didactiques)
ISBN 2-85939-866-X;

The Russian psychologist Lev Semyonovitch Vygotsky is sometimes quoted too readily, his trenchant ideas often blunted in the retelling. The author of this book does not seek to summarise Vygotsky's thought but to question it.



After presenting some of the principles of Vygotsky's cultural-historical psychology, the author carefully examines the arguments that allowed Vygotsky to assert that apprenticeships pave the way for cognitive development. Following Vygotsky's line of argument, the author tries to demonstrate what can be learned by placing the question of the relationship between apprenticeship and development in historical context. The concepts of the school situation, of context, of recontextualisation, of conceptualisation in a school situation, allow us to understand Vygotsky's ideas and hypotheses more thoroughly and to use them to practical effect. Finally, Olga Anokhina and the author offer the reader a 1929 text by Vygotsky, hitherto unpublished in French, which is particularly useful for understanding the origins of the cultural-historical theory.

IE Achieving the Lisbon goal: the contribution of vocational education and training systems: country report: Ireland / Tom May, Pauline Gildea and Ger Melia

Qualifications and Curriculum Authority - QCA
London: QCA, 2004, 29 p.

This report on Ireland is part of a series of European reports on the contribution of national vocational education and training systems to achieving the objectives set by the Lisbon conference of 2000. The full report of the same name has been prepared by the Lisbon-to-Copenhagen-to-Maastricht Consortium for the European Commission. The country report is structured according to three themes: (1) progress made by the VET system towards meeting the challenges of Lisbon, (2) innovation in teaching and learning processes and (3) building European skills for a European labour market.

http://www.refernet.org.uk/documents/Country_Report_Ireland.pdf

Implementing the Irish national framework of qualifications: clarification of the concept and prototype / Jonathan Winterton, Françoise Delamare, Emma Stringfellow. Clark, Gordon

Brussels: European Commission, 2005, 19 p.

Presentation by Mr Gordon Clark of the Commission at the 'Implementing the Irish National Framework of Qualifications' conference, Galway, 24-25 February 2005. The Irish Presidency in the first half of 2004 played

a key role in achieving agreement to the Joint Interim Report of the Commission and the Council, 'Education and Training 2010', in February 2004. It was this report that for the first time called for the establishment of a common European Qualifications Framework.

http://libserver.cedefop.eu.int/vetelib/eu/pub/commission/dgeac/2005_0043_en.doc

IS Educational reform in Iceland: a study of national and international influences / Gunnlaugur Magnússon. Stockholm University, Institute of International Education

Stockholm: Stockholm University, 2004, 73 p.

This study aims to analyse recent educational reform in Iceland on the basis of specific definitions and theories. The research is based on a review of literature on education and educational reforms, both by international scholars and with a specific Icelandic focus. The study begins by discussing educational reform and related concepts, such as choice, decentralisation, privatisation and globalisation. It then presents Icelandic society and the history of the educational system and goes on to discuss the background of the recent reform and to analyse the reform itself. The study provides a framework for comparison within which it places the reform. Finally, the findings of this comparison are presented and discussed. The conclusion is that the recent reform in Iceland has taken many of its cues from the theories discussed, leaning most on the concept of decentralisation and least on privatisation.

<http://www.interped.su.se/publications/iceland.pdf>

IT Formamente: la rivista del lifelong learning. [Formamente: the lifelong learning journal].

Ministero del lavoro e della previdenza sociale, Ufficio centrale per l'orientamento e la formazione professionale dei lavoratori - UCOFPL

Rome: UCOFPL, 2004

Formamente is the journal for lifelong learning in Italy and Europe. The publication includes contributions on formal and non-formal training; training for young people, women and adults; and lifelong learning in Europe and beyond.



Formamente è una rivista quadrimestrale rivolta a favorire la conoscenza del Lifelong Learning in Italia e in Europa. La pubblicazione si avvale del contributo di una serie di attori coinvolti nel sistema di formazione permanente formale e non formale. Formamente è articolata in un focus, quattro sezioni fisse, Giovani, Donne e Adulti, Europa e dintorni. Sono inoltre disponibili riferimenti bibliografici e siti internet per approfondire il tema della formazione permanente.

<http://www.welfare.gov.it/EuropaLavoro/ProdottiServiziComunicazione/ProdottiEditoriali/Riviste/Formamente>

LT Kompetencija grindziamu kvalifikaciju sistemose Lietuvoje pletote: baigiamosios konferencijos medžiaga / Profesinio mokymo metodikos centras. [Development of competence - based qualification system in Lithuania: final conference paper]

- PMMC; Vilnius: Profesinio mokymo metodikos centras, [Methodological Centre for Vocational Education and Training 2004, 32 p.

The paper is dedicated to the Finnish-Lithuanian project 'Development of competence-based qualifications system in Lithuania'. Topics analysed in the paper are: competence-based qualifications system in Finland, assessment and recognition of qualifications in Lithuania, experience of development of competence-based qualifications system in Lithuania, etc.

LV Cik eiropiska ir Latvijas izglitiba? / Catlaks, Guntars How European is Latvian education?

In: "Diena", 2004.19.06

Latvian National Library, Kr. Barona 14, Tel.: (371) 7365250, <http://www.lnb.lv>

This paper discusses the quality of education in Latvia, the extent of the European orientation of its recent educational reforms, and how Latvian education compares with standards in Europe.

NO Dokumentasjon av realkompetanse i arbeidslivet. [Documentation of non-formal competence in working life].

Nordland fylkeskommune

Bodø: Nordland fylkeskommune, 2004, unpagged

This is a compilation of documents and/or databases which together form a uniform tool for documentation of non-formal com-

petence in working life. The tool is intended for use by both workers and employers, across different sectors and professions. Its areas of use comprise: For the individual: - job development in own workplace; when applying for another job; when applying for education/training, to document existing skills and competence. For the employer: strategic competence development in own business (key words: basis for common training plans, quality development, restructuring, life phase policy, follow-up of sick leave, disabled at work etc.); tailored formal training based on needs of the enterprise. Tool content: CV, certificate of (non-formal) competence, description and documentation of key competence areas.

<http://www.nfk.no/visdokument.asp?LID=8&UID=499&DID=4908&MID=9&SID=62&HID=1>

PL Poland: resource dossier / prepared by Helmut Zelloth in cooperation with the Polish National Observatory.

European Training Foundation - ETF National Observatory of Poland Turin: ETF, 2004, 23 p.

The purpose of this dossier is to compile information that would make it easier for ETF know-how and resources to be transferred to Cedefop, in accordance with the agreed exit-entry approach. It contains: a) a list of resources associated with the process of vocational education reform. These are policy and analysis documents on important aspects of the reform process. The materials and documents are classified under three main headings - Employment, Education and Training, and General. b) The dossier also contains a list of contacts and networks. The contacts are classified according to six main categories - Government agencies, development and research agencies, non-governmental organisations, social partners, distance education centres and vocational guidance institutions. c) Also included in the dossier is a list of key websites of agencies involved in the reform process. d) Finally, a chronology highlighting major steps in the reform process has been included in section 5.

http://libserver.cedefop.eu.int/vetelib/nat/pol/gov/2004_0001_en.doc



PT Um perfil de qualificação para os recursos humanos do sector turístico: a visão dos empresários dos sub-sectores de alojamento e restauração do baixo Alentejo / Marta Isabel Casteleiro Amaral.

[A qualification profile for human resources in tourism: the view of entrepreneurs in the housing and catering sub-sectors in Baixo Alentejo] / Amaral, Marta In: Sociedade e Trabalho, 19/20, p. 81- 90
Lisbon: DEEP, 2004

Acquiring a vocational qualification is increasingly a key to progress, and occasionally even to survival, of workers in the labour market. This article attempts to identify the necessary qualifications for workers in the tourism sector, on the basis of research undertaken by the author toward fulfillment of the requirements for a master's degree. The dissertation investigated which skills entrepreneurs consider most important for their employees and for themselves, in this sector and region.

SE Lärande i vuxenlivet / Claes-Göran Wenestam & Birgit Lendahls Rosendahl.

[Learning in adult life.]

Lund: Studentlitteratur, 2005, 229 p.

ISBN 91-44-04177-2

Studentlitteratur AB, Box 141, S-221 00 Lund, Sweden

During the last few decades adult education has been attracting much interest, not least because of increasing demands for in-service training. This anthology discusses education, training and learning with a particular focus on adults.

SI The role of national qualification systems in promoting lifelong learning: country background report - Slovenia / prepared by Miroljub Ignjatović et al.

Paris: OECD, 2004, 86 p.

Lifelong learning for all is the guiding framework for OECD's work on learning, both formal and informal. Systemic considerations include foundations; outcomes; access and equity; resources; pathways; visibility and recognition; and policy co-ordination. This country background report on Slovenia was written for the OECD project, 'The role of national qualifications systems in promoting lifelong learning'. Until the early 1980s, the educational system in Slovenia was organised in two parallel ways: a school-based education, with practical training provided partly in school workshops and partly in enterprises; and an apprenticeship system similar to the German dual model.

<http://www.oecd.org/dataoecd/33/28/34258475.pdf>

UK Demand for information, advice and guidance / Jayne Taylor, Andy Byrom and Darcy Vasickova.

Leicester: The Guidance Council, 2005

'This book aims to provide information about the nature & scale of client demand for guidance services. This comprehensive study assesses how the public's perceptions of information, advice and guidance (IAG) have changed since 2000. It analyses the relevance and perceived benefits of IAG, and suggests how provisions can be improved to meet the changing needs of adults. It proposes strategies to promote wider access and take-up of IAG services.'



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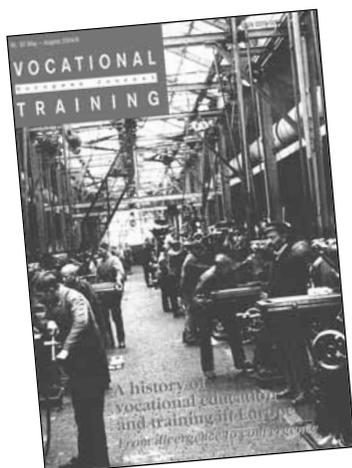
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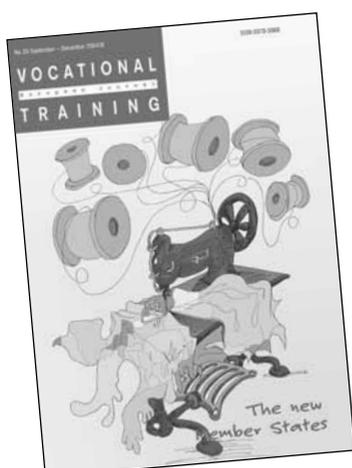


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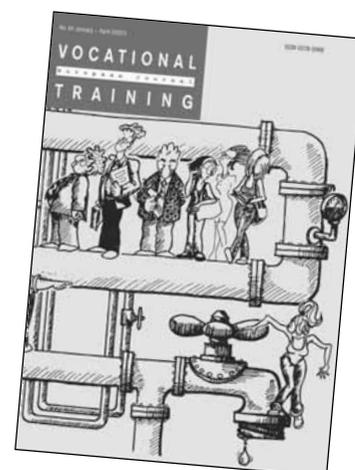
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