Modernising vocational education and training: 
the importance of information, advice 
and guidance over the life-cycle

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Abstract

To understand information, advice and guidance (I AG) in a lifelong learning perspective it is crucial to consider the reasons why people tend to spread learning over their life span. We propose that there are three main reasons for adult learning:

(a) skills with a high level of depreciation might require regular updating;

(b) economic or technological shocks in the labour market can make it necessary to reinvest in other skills;

(c) people might want to repair previous inadequate choices in initial or post-initial education.

We show that a large share of participation in education among adults can be related to misguided choices in initial education. We find that approximately 20 % of young graduates regret their choice of educational field. Many go back to school later to repair their inadequate educational choice. In addition, most people who acquire a qualification at a later age would – looking back at their career – have preferred to have done it when they were young. There are substantial costs involved with learning at a later age if this is related to misguided choices: estimates show losses ranging from 3.2 % of GDP in France to 11.5 % in Italy. These losses pinpoint the need for early guidance. We give evidence that I AG can reduce misguided choices.

In sum, the findings show the very important role of I AG in lifelong learning as accurate I AG early in life reduces the amount of lifelong learning.

Once at work, people learn mainly by doing: 94 % of the time spent on learning is by performing tasks on the job. Learning at the workplace is highly integrated with actual work practice, and requirements thus become more specific. Consequently, learning depends on the ability of people to identify learning opportunities that occur in their daily work practice. In addition, regarding training courses, about 17 % of respondents regret the topic of training and 50 % indicate that in retrospect they would have preferred to participate in these courses earlier. This suggests that people frequently realise rather late that a certain course might be very useful to them. The Eurobarometer 59.0 (January-February 2003) shows that many people feel that they need good quality information and tailored advice to take up studies or training again. We provide evidence that mentoring or other I AG increase the adequacy of the choice of training or working tasks and are a useful instrument to invest in timely training.
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Introduction

The aim of this research is to provide a framework for thinking about the effect of information, advice and guidance (IAG) on the efficiency of vocational education and training (VET) in a lifelong learning perspective, to overview the literature in this field and to provide empirical information for the US and European countries, with a special focus on the Netherlands.

To understand IAG in a lifelong learning perspective it is crucial to take into account the reasons why people tend to spread learning over their life span. Information plays an important role in the timing of participation in training and education, so policies that change the availability of IAG might also affect when people choose to participate in education and training. Section 1 provides a theoretical framework for thinking about the relationship between IAG and lifelong learning. The point of departure of the theoretical framework is that hypothetically there are optimal investments in human capital and that there is a hypothetical optimal timing of these investments (Ben-Porath, 1967). But especially at young ages, people are not able to fully grasp the costs and benefits of participation in education and training, not only due to uncertainty with respect to labour-market development but also because of uncertainty with respect to individual capabilities and preferences. Uncertainty increases the probability of an ex post ‘wrong’ or sub-optimal decision. This will lower the efficiency or productivity of the acquired human capital and will make some people reinvest in education or training to repair earlier investments. Further, empirical evidence has shown that people tend to choose more general types of education and training to avoid these misinvestments. Improved IAG could, therefore, stimulate participation in VET. There is also evidence that less effort is put in learning due to the uncertainty of the returns (see also Gillie and Isenhour, 2003).

We will argue in Section 1 that there are three main reasons for adult learning:

(a) skills with a high level of depreciation might require regular updating. This might especially be important if these skills are complements to more general or academic skills which have a lower level of depreciation. To maintain the value of these general or academic skills, investments in continued training for the specific skills can be valuable;

(b) economic or technological shocks in the labour market can make it necessary to reinvest in other skills;

(c) people might want to repair previous inadequate choices in initial or post initial education.

The remainder of the report consists of three parts. In Section 2 we will overview the effect of IAG on initial education and training choices. Section 3 discusses IAG and continuing

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(1) These skills are often referred to as specific skills.
learning. Section 4 concludes and discusses implication for research, policy, and practice.

Section 2.1 gives a brief overview of the literature on IAG.

In Section 2.2, we introduce a measure for the quality of the educational choice, which we included in several surveys for the Netherlands (2). Often measures concerned with the quality of the educational choice look at the knowledge students have of their future occupations. We instead measure the quality of the choices with respect to education and training in retrospect. The idea of our measure is that people have to make choices regarding training and education at a point in time when they are potentially not fully aware of the future consequences. Once the training or education is finished this image will become clearer. We, therefore, ask people whether they in retrospect would choose the same education or training again. This approach offers a measure for the adequacy of the choice in education and training. We find that approximately 20% of the young graduates regret their choice of educational field. In the Netherlands, in vocational education these percentages are higher than among graduates from universities. Further, this percentage increases when people acquire more experience.

In accordance with the idea outlined in Section 1, we find that many of the people who regret their choice go back to school later to repair their inadequate educational choice. Section 2.3 shows that there are significant costs involved with regretting the educational choice and with learning at a later age. Combined with the findings in the earlier sections, these costs pinpoint the need for early guidance.

In Section 2.4 we analyse the adequacy of the timing of education by asking people retrospectively when they think their education would have been most appropriate. It turns out that most people who acquire a qualification at a later age would – looking back at their career – have preferred to have done it when they were young. This suggests that a large share of participation in education among adults can be related to misguided choices in initial education.

In Section 2.5 we overview the literature about the effects of IAG and show that IAG has a beneficial impact on choices regarding fields of study at college, and that it may prevent students from dropping out of school. Section 2.6 concludes.

In Section 3.1 we look at the effects of IAG for learning at school and for learning at the workplace. There is less research on the effects of IAG for adults, but as we will show later, among others Ohsako (2000), Niles et al. (1998), and Robitschek (1997) indicate that adults can benefit from guidance as well. Once at work, people learn mainly by doing. A rough estimate (Borghans et al., 2006) indicates that 94% of the time spent on learning is by

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(2) These surveys include large scale surveys among Dutch high school and college graduates 1.5 years after graduation for 1991-2005, a survey on a representative sample of the Dutch population in 2005 and a survey on European college graduates three years after graduation in 1998.
performing tasks on the job. Until the age of 40 training is still a reasonable part of the learning process, but when workers are older than 40 most of what they learn is on-the-job learning. Learning in the workplace is highly integrated with actual work practice, and requirements thus become more specific. Consequently, learning depends on the ability of people to identify learning opportunities that occur in their daily work practice. There is evidence (e.g. Siann et al., 1998; Buckham, 1998) that it is very hard for people to make adequate learning decisions and to understand how the learning process can be organised. IAG could, therefore, also help people to identify and gain more from the learning opportunities at work. Evidence from the Eurobarometer 59.0 (January-February 2003) shows that indeed from 40 years on people indicate more frequently that good quality information and tailored advice are needed to take up studies or training again (see also Cedefop, Chisholm, 2004).

In Section 3.2 we show that for training courses about 50% of people indicated that in retrospect they would have preferred to participate in these courses earlier. This suggests that people frequently realise rather late that a certain course might be very useful for them. IAG might, therefore, be a useful instrument to invest in training timely. Section 3.3 concludes.

Section 4 gives the overall conclusions and discusses implication for research and policy.
1. Lifelong learning and IAG

Traditionally, career guidance literature is focused mainly at the educational and vocational choice of young people. This is because for most people the main investments in education take place until their early 1920s, and vocational specialisation in the form of working or training generally starts at the end of full-time education. Career guidance research’s main concern is, therefore, whether the development of young people and their vocational choice keeps pace with the educational career.

In recent years the awareness that a well-educated and trained workforce is crucial for society has been growing (among others OECD, 2003). Related to this, many stress that learning is not exclusively related to initial education, but that people have to improve and maintain their knowledge and skills throughout their career (e.g. OECD, 2003; Onderwijsraad, 2003; Groot and Oosterbeek, 1994; Groot and Maassen van den Brink, 1997; Dorhout et al., 2002). VET plays an important role in both initial education and training during the career. Since investments in human capital are very important for the knowledge-based economy, potential improvements in the efficiency of the system have to be considered carefully.

A straightforward conclusion is that as learning continues over the life span, so should also IAG. Important issues are, therefore, whether learning at later ages has the same character as learning when people are young, and whether IAG has to play the same role for adults as it does for young people.

1.1. A new framework for thinking about the benefits of IAG in lifelong learning (3)

To address these issues, one needs to consider the reasons for adults to continue learning. Issues related to IAG are related to the reasons why people continue learning. In this section we, therefore, provide a theoretical framework for adult learning that can shed light on the role of IAG in a lifelong learning perspective.

Before we continue, a note on terminology is necessary. Throughout the report we will use the general term ‘learning.’ Our framework is relevant for all types of learning no matter how learning is organised (formal, informal and non-formal) and whether learning leads to certifications. We distinguish between ‘education’, ‘training’ and ‘learning-by-doing.’ Education is defined as learning in high schools, (vocational or professional) colleges and universities. Training is defined as learning by taking courses in connection to the work someone does. The main difference between education and training is that education usually takes several years to complete, while training takes less long time to complete and takes place during active life. Learning-by-doing is defined as learning by performing tasks at the job.

(3) This section is based on Borghans and Golsteyn (2006c).
1.1.1. The benefits of lifelong learning: increasing the skill level of the population

The OECD recently explored the topic of lifelong learning, asking ‘why is adult learning important?’ Their answer is that ‘there are several reasons why, in recent years, adult learning has become an important item on the policy agenda. Education and training contribute to the human capital of individuals and make them more efficient workers as well as better-informed citizens in a knowledge society. [...] In the economic domain there are possible benefits of increased employability, greater productivity and improved-quality employment. In the social domain, one can include individual well-being and increased social returns such as better health, lower incidence of crime, etc. There are as well the political benefits of improved civic participation and a strengthening of the foundations of democracy.’ (OECD, 2003, p. 26-27). The report’s drift is that the level of education is too low in many countries to meet the requirements that are put upon individuals in the labour market as well as in other spheres of life. According to the OECD enormous efforts will have to be made to increase the education level. The only way to realise this in the short run is to educate not only the young but also adults. Borghans and Golsteyn (2006c) note, however, that the advantages of education and training mentioned in the report are in fact advantages of education in general and not advantages of learning at a later age. A major disadvantage of learning at a later age, as mentioned, e.g. by Blöndal et al. (2001), is that opportunity costs of learning rise with age. This leaves the question why it would be beneficial to continue learning after initial education or to postpone learning from a young age to a later age.

Many authors have found benefits of learning after the initial education. Cedefop, Descy and Tessaring (2005) give an extensive overview of the literature. One of the authors focusing on the benefits of learning at a later age is Jenkins (2004), who finds a strong association between adult learning and the probability that women who were out of work in 1991 returned to work between 1991 and 2001 after controlling for a range of family and economic circumstances. Stenberg (2006) finds in a recent paper that one year of adult education leads to a growth in annual earnings of approximately 10%. Feinstein et al. (2004) find that training has a positive effect on wage growth. However, they also find that firms cherry-pick workers. If those who did not follow training had followed training, they would not have gained from it. Schöne (2004) asks why the return to training is so high. He finds that training (\(^4\)) increases wages by 5%: similar to one year of education. However, unobserved heterogeneity in wage levels is the most important contributor to the excessive estimate of training returns. Trainees seem to have some favourable unobserved characteristics correlated with wages. After controlling for this bias, the returns to training fall considerably but remain significant and equal to approximately 1% which is high given the short duration of the training. There is substantial other evidence that some workers are offered more opportunities for investment in training than others. Groot and Maassen van den Brink (2003) overview the

\(^4\) ‘Training’ refers to a wide variety of types of training, measured by the question ‘have you, with this firm, received any formal education in the form of training during the last 12 months?’.
literature to find that more educated workers, younger workers and male workers receive more training.

1.1.2. The benefits of lifelong learning: optimal life-cycle skill formation

In economic literature, the seminal work by Ben-Porath (1967) shows that the optimal path of human capital accumulation contains three phases: full-time education at a young age, part-time education or training after a certain point in time and no investment when close to retirement. Many studies have analysed the optimal path of learning and extended the model by introducing for instance leisure (Heckman, 1976) or uncertainty (Williams, 1979). In a series of recent papers, Heckman (Cunha et al., 2005) finds that:

(a) skill attainment at one stage of the life cycle raises skill attainment at later stages of the life cycle (self-productivity) \(^{(5)}\);

(b) skill begets skill through a multiplier process and hence early investments facilitates the productivity of later investments (complementarity) \(^{(6)}\);

(c) early investments are not productive if they are not followed up by later investments.

The usual interpretation of the model (e.g. Southwick and Zionts, 1974) is that people continue to invest in learning to combat the depreciation of their skills. In contrast with this interpretation, Mincer (1997) and Borghans and Golsteyn (2006c) show that the driving force in Ben-Porath’s model, why people spread their investments in human capital, is that – within one period – learning has decreasing returns to scale. So the crucial assumption in the Ben-Porath model is that people learn more effectively when they spend fewer hours on learning per week. The reasoning behind this argument is that an individual has limited psychic and intellectual capacity (Mincer, 1997). Although this might be true, we do not think that learning efficiency is the main argument for lifelong learning.

1.1.3. Three reasons for lifelong learning

Borghans and Golsteyn (2006c) show that in the Ben-Porath framework there could be three reasons why it could be optimal for people to postpone learning until adulthood. The first is that there are specific skills, which are complementary to a person’s general educational development, which depreciate much faster than the general skills and, therefore, have to be renewed. One could think of knowledge about new legislation, software programs, etc. If the depreciation rate of this specific knowledge or its relative importance have increased, people will – when investing optimally – spend more time on learning these skills while working to maintain their specific skills. Borghans and Van Loo (2002) identify learning and

\(^{(5)}\) This is also known as the ‘Mathew effect’. Cedefop, Descy and Tessaring (2001) also acknowledge that an initial stage needs to equip young people with foundation skills enabling them to become lifelong learners.

\(^{(6)}\) Rosen (1976), Jenkins et al. (2001) and Brunello (2001) also find evidence for complementarity.
depreciation. They show that for most skills, learning (7) stops after a certain age, only field specific and computer skills continue to be acquired at later ages suggesting that learning these skills is interrelated with the actual production process. Field specific skills are the only skills acquired significantly more by workers who just entered the labour market than after five years, hence these skills may be much more efficiently acquired at work than at school.

The second reason for investing in human capital at a later age could be an unexpected change in the circumstances. One obvious candidate for this is a shift in the wage structure. An increase in the price of human capital will not affect investment decisions, since this will increase the value and the costs of further investments simultaneously. However, when the value of high levels of human capital increases substantially, people who took less education when they were young, might decide to go back to school. There is evidence that the increase in adult participation in education in the US is indeed related to the increase in wage inequality. In other countries, where the wage inequality between skill levels has been much more stable, adults’ participation in education was also more stable over time. The other candidate is a drop in the individual discount rate. At a later age, people might get rid of binding credit constraints, or might become aware of the importance of education for their later career. In such cases it can be explained that people invest in general education – in contrast with specific skills – later during the life-cycle.

A third reason why people might go back to school is individual uncertainty (8). People may generally not be able to fully grasp the costs and benefits of participation in education and training. This is not only due to labour-market developments or changes in discount rates but may even be due to uncertainty with respect to individual capabilities and preferences. There is ample evidence that for young people it is very difficult to adequately project themselves working in a specific occupation later in their life. Knowledge about the occupation is limited (9), but it is also very difficult for young people to understand how they will value aspects of their job when they are older, for example Borghans et al. (2003) find that many young girls who choose to become a flight attendant, do not realise \textit{ex ante} how much they will value being with their family once they grow older and have children. As a consequence, the level of regret of choosing their educational discipline among flight attendants is very high. Uncertainty will increase the probability of an \textit{ex post} inadequate educational choice. Later in their career these people might realise that they made a choice that did not fit to their preferences and capabilities.

In sum, we argue that in the discussion about lifelong learning a distinction has to be made between maintenance and reparation. Increases in the level of time spent on maintenance can reflect optimal reactions to new circumstances, but will mainly relate to specific knowledge

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(7) In their research, ‘Learning’ entails all types of learning, such as learning at college, from colleagues, or at home.

(8) This applies mostly to going back to education. It applies less to training.

(9) This applies less to training because people are often already working. However, Borghans and Golsteyn (2006d) show that also workers have problems understanding which skills they will need to invest in.
characterised by high levels of depreciation. Reparation only reflects erroneous decisions in the past. People may regret their choice of educational discipline for instance when they find out after graduation that the position of their qualification on the labour market deteriorated and they are going to earn a lower wage than the wage they expected. A decrease of the wages of a specific qualification will only be a temporary reason to invest in education since it only applies to those who have already chosen an education. Once young people know the new wage structure, they may adjust *ex ante* their initial investment decisions, making later corrections abundant. If reparation is also characterised by a lack of understanding how important education and vocational choices can be for the career, or to young people facing credit constraints which prevent them from entering education, the phenomenon can be more persistent. The best policies to combat these underinvestments will be to help people choose their educational field by providing IAG and to relieve credit constraints. When reparation is the reason for adult learning, both policies – when successful – will induce a shift from adult learning to investments in education at a younger age.

1.2. The growing importance of IAG

Improvements in IAG throughout the whole career is regarded by many as a way to improve the efficiency of the VET system. Following the ideas in the section above, there are three reasons why adequate IAG has become of growing importance:

(a) since in VET education and training are closely linked with specific occupations, choices regarding participation in education and training are associated with a higher risk. People can make ‘misinvestments’ because economic conditions can change and alter the value of specific skills in the labour market. Research (e.g. Jovanovic, 1979) has shown however that a large fraction of such misinvestments is related to a mismatch between an occupation and people’s personal capabilities and preferences. Somebody chooses to be schooled for a certain profession because he/she expects that this job will suit him, but experiences later that this choice was based on a misconception. Borghans and Golsteyn (2006a) show that 20 to 40 % of all Dutch workers who left education (\(^{10}\)) indicate they would have chosen another field of study if they could choose again. Many of them actually decide to go back to education. In this report we will show estimates of the costs of these reinvestments for several European countries. The estimates vary between 3.2 % (France) and 11.5 % (Italy) of the total labour costs in these countries. Throughout this report, we will show that IAG plays an important role in improving choices with respect to education and training;

(b) with the growing importance of lifelong learning, similar participation decisions regarding education and training have to be made throughout the whole career. There are several reasons why these later investments are more complex for individuals to be made. Borghans and Golsteyn (2006d) show for instance that many people do not know

\(^{10}\) The study does not include students from VET.
which courses to take to reduce skill deficiencies at work. Once people have left initial education (11), most of their time is spent on other activities than learning, so in this environment it will be less obvious to think about learning opportunities. Schools (12) offer uniform and consistent curricula, but training for further development and maintenance requires that people select specific courses, based on their capabilities and frailties, therefore requiring much more self-reflection. Finally, since learning by doing contributes substantially to the acquisition of skills of people who are working, the work environment and possibilities for learning at work have to be taken into account in training decisions;

(c) finally, the very nature of lifelong learning also implies that people have to decide about the optimal timing of training participation. Recent survey results show that apart from what kind of training to participate in, people also face serious difficulties in deciding when to take part in these courses. Many respondents indicate that looking back at previous training participation, they would prefer a different timing of the same course (Borghans and Golsteyn, 2005). IAG is an important policy instrument to assist people in making these difficult choices and, therefore, to increase the efficiency of the VET system. Recent research has shown the benefits of such policies (e.g. Bimrose et al., 2004; Bosley et al., 2002; Killeen et al., 1994; Mayston, 2002).

(11) The study does not include students from VET.
(12) And plausibly also apprenticeships.
2. IAG and initial education and training choices

2.1. Vocational choice theory and research and its links to IAG

Herr (2001) gives an interesting overview of the historical development of the research on career guidance. He defines career development as ‘both the constellation of psychological, sociological, educational, physical, economic and chance factors that combine to shape individual career behaviour over the life span (Sears, 1982) and the interventions or practices that are used to enhance a person’s career development or to enable that persons make more effective career decisions (Spokane, 1991, p. 22)’ (Herr, 2001, p. 196). Herr describes that the need for vocational guidance emerged in the US as a reaction to:

(a) increased urbanisation and occupational diversity due to the industrialisation in the late 19th, early 20th century;
(b) the large immigration into the US;
(c) the notion that workers should have a right to determine their own destiny instead of being the chattels of employers.

An influential related stimulus was the emancipation of women on the labour market.

Parsons (1909) in his influential book *Choosing a vocation*, laid the foundations which guided the development of vocational guidance for at least the first 50 years of the 20th century. He argued that a three-step paradigm could serve as a framework for the counsellor:

(a) a clear understanding of yourself, aptitudes, abilities, interests, resources, limitations, and other qualities;
(b) a knowledge of the requirements and conditions of success, advantages and disadvantages, compensation, opportunities, and prospects in different lines of work;
(c) true reasoning on the relations of these two groups of facts (Parsons, 1909, p. 5; Herr, 2001, p. 201).

This quote shows that the basis of career guidance is to enhance getting ‘a clear understanding of yourself’. Compared to economic theory, it pays less attention to the demand for specific occupations in the labour market. In economic theory, a lot of evidence suggests that people are partly guided by wage considerations in their choice of educational field (among others Willis and Rosen, 1979; Robertson and Symons, 1990; Keane and Wolpin, 1997). There is also an important development in economics literature which focuses on expectations of wages. These theories can explain which people make better choices than others (Dominitz and Manski, 1994; Betts, 1996). For career guidance this implies that information about expected wages and job opportunities in specific occupations and industries
can improve educational and vocational choices. There are several initiatives in the Member States to identify skill needs and to inform people about market opportunities (13). When making educational and vocational choice people have to combine self-knowledge and information about the contents of a job with labour-market information. Career guidance approaches to help people balancing these aspects are still underdeveloped.

In their review of the literature, Levine (1976) and Gottfredson (1981) explain how vocational choice became to be seen as a development process, which parallels with the development of a self-concept. In the second half of the 20th century, among others Super (1957, 1990) influenced the nature of vocational guidance. His life-span approach focused on the development of the self-concept, where the individual translates self-concepts into occupational preferences, moves into occupations and actualises the self-concept (14). Vocational choice would be the result of a process starting with individual’s early fantasy choices, followed by tentative choices and then by realistic choices. The individual learns from experiences, a process that is largely irreversible. They distinguish five stages related to specific ages. In each stage people develop specific skills:

(a) growth stage: 4-11 fantasy, 11-12 interests, 13-14 capacity;
(b) exploration stage: 15-17 tentative, 18-21 transition, 22-24 trial;
(c) establishment stage: 25-30 trial, 31-44 stabilisation;
(d) maintenance stage: 45-64;
(e) decline stage: 65-70 deceleration, 71+ retirement.

Around age 10 the role of gender is identified, around age 12 social class identity is included, after age 14 the unique self develops with personal preferences and estimations. More recently, Helwig (2001) used a 10-year longitudinal survey to confirm Gottfredson’s theory that the occupational aspirations of children develop in five stages (15).

Holland (1987) analyses vocational choice as a matching process. In his trait-factor theory, individuals compare their personality with the environment and select the most suitable occupation. The vocational choice itself is organised in the following steps: recognising the need for a decision, searching for information, developing alternatives, making the decision, implementing, and overcoming post-decision making problems.

(13) These include, for example, European Employment Observatory networks, Network on early identification of skills needs in the UK, and Cedefop Skillsnet. See for a more extensive overview http://www.trainingvillage.gr/etv/Projects_Networks/Skillsnet/websites.asp.

(14) Other seminal contributions have been made by Ginzberg et al. (1951), Roe (1956), Holland (1966), Krumboltz (1979).

(15) In line with the idea that children develop in certain stages, a series of recent papers written by Heckman (e.g. Cunha et al., 2005) discuss that both cognitive abilities (like IQ) and non-cognitive abilities (like time preference, self control, temperament, etc.) can be developed at young ages. However, some stages in life are more productive in producing certain skills. Heckman calls these stages sensitive periods for these skills. If one stage alone is effective in producing a skill, it is called a critical period.
The practice of IAG follows the developments in the literature on career counselling closely. And vice versa, experiments with the practice of IAG also form the basis of many empirical papers, as we will discuss in greater detail below. Importantly, many assessment instruments were developed to empirically test the theories: for example, the self-directed search, the vocational preference inventory, adult career concern inventory, career maturity inventory, the values inventory, the career beliefs inventory. In the last decades of the 20th century these assessment instruments were used by, among others, Campbell et al. (1983), Herr (1997), Holland et al. (1981), Hoyt (1980), Oliver and Spokane (1988), and Spokane and Oliver (1983) to demonstrate the effectiveness of tools of career counsellors to help their clients make more adequate career choices.

2.2. Regretting initial education and training choices (\textsuperscript{16})

To be able to determine the empirical relevance of the concept of reparation of human capital investments, we need a measure for the quality of choices in education and training. In principle, people could be interviewed about the image they have of aspects of their future job and this image could be compared to actual aspects of the jobs. However, for two reasons such an approach is undesirable. First, in this case the researcher would determine which aspects are crucial for comparing image and reality. A person can have an inadequate image of the reward in a certain profession but if the reward does not interest him/her, it does not matter in the evaluation of the educational choice either. There can be other aspects (e.g. the amount of leisure or commuting time, the provision of child care facilities by the employer, etc.), which the researcher does not think of, which are crucial for the individual to decide to follow a certain education or training. Second, it is not likely that many people will ever get a very clear image of their future profession (in part also because these professions are changing constantly) (\textsuperscript{17}). It is sufficient that one has enough information to make a responsible choice (\textsuperscript{18}).

The idea underlying our measure is that a person makes an adequate choice if he/she makes the same decision based on the imperfect information, as he/she would make if he/she knew all the consequences of his decision. Assuming that people have a clear understanding of the consequences of their choice 1.5 years after they finish education and training, we ask them ‘would you, in retrospect, choose the same education/training as the one you followed again?’ Those who answer they would – at the same or another institute – apparently made the right choice. If the respondents indicate they would have wanted to study another

\textsuperscript{16} This section is based on Borghans and Golsteyn (2005).

\textsuperscript{17} Workers who have to decide upon which training to follow know better what their profession is like, but Borghans and Golsteyn (2006d) show that many workers experience difficulties choosing the right courses.

\textsuperscript{18} Symons (1997) has a rather pessimistic view on the capabilities of the young to choose their education. He poses the following provocative question: ‘would you let a 16 year old tell you what to do with the rest of your life? The answer would be a very clear, obvious and emphatic ‘no’. In reality however, this is what most of us do in making long-term decisions about careers in high school.’
discipline (or no education or training at all), we consider they regret their educational choice, thus indicating a low adequacy of educational choice (19).

Of course, at the individual level there might be differences in the way people answer this questions and unpredictable changes in circumstances and specific personal circumstances may affect the *ex post* evaluation of the study chosen. Even people who are not well-informed might be very satisfied with their choice afterwards. Further, people will not experience all facets of their job and especially will not experience alternative professions they did not choose. For that reason the knowledge of respondents to the retrospective question is not perfect either. Still knowledge of the pros and cons of the choice made will be much better than when the initial educational choice was made. Therefore, we consider that the percentage of people who regret their choice *ex post* is a good proxy of the adequacy of the choice in a certain group.

We included this measure in several surveys. These surveys include large scale surveys among Dutch high school and college graduates 1.5 years after graduation for 1991-2005 (Research Centre for education and the labour market graduate survey), a survey on a representative sample of the Dutch population in 2005 (*Enquête levenslang leren*) and a survey on European college graduates three years after graduation in 1998 (Cheers, Careers after higher education: a European research study). Table 1 gives an overview of these datasets.

<table>
<thead>
<tr>
<th>Survey</th>
<th>Date</th>
<th>Target Group</th>
<th>Timing approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIS (Schoolverlaters Informatie Systeem)</td>
<td>1991-2005</td>
<td>Dutch graduates from VMBO, HAVO, VWO, MBO, HBO, WO (1)</td>
<td>1.5 years after graduation</td>
</tr>
<tr>
<td>Cheers (Careers after higher education: a European research study)</td>
<td>1998</td>
<td>European college graduates</td>
<td>3 years after graduation</td>
</tr>
<tr>
<td><em>Enquête levenslang leren</em></td>
<td>2005</td>
<td>Representative sample of Dutch population</td>
<td>All ages</td>
</tr>
</tbody>
</table>

(1) See the Annex for an overview of the Dutch educational system. See also list of abbreviations.

(19) Students may regret their education for the wrong reasons as they may have very little information about the alternative disciplines and related occupations.

17
Table 2 shows for a Dutch sample of graduates that on average 21% of the respondents regret their educational choice 18 months after entering the labour market. It is of course important to investigate whether the answers of the respondents really can be interpreted as an indication of an inadequate educational choice and whether this indicator does not merely reflect satisfaction with the transition from school to work. There are many indicators that the variable picks up the right things. Correlation with questions about job satisfaction and the transition from school to work is very low and it is not especially the group of unemployed or people who did not find an appropriate job who say that they regret their choice. Of course, low wages and high unemployment might cause people to regret their choice, but analyses show that mainly the labour-market conditions for a field of study in general rather than the individual outcomes are related to regret. Further, the correlation between regret and unemployment levels and average wages is not very strong. It is mainly the change in these circumstances that leads to regret. This implies that when students know that employment perspectives of a certain study are not very good, they do not regret their choice afterwards. When, however, good perspectives deteriorate while they are enrolled, students do regret this choice, which they made lacking adequate information about future labour-market perspectives. This implies that our measure of regret is more related to the adequacy of the educational choice than with the satisfaction with the transition from school to work.

<table>
<thead>
<tr>
<th></th>
<th>Regret</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vocational college</td>
<td>27.9</td>
</tr>
<tr>
<td>Professional college</td>
<td>20.1</td>
</tr>
<tr>
<td>University</td>
<td>19.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>20.7</td>
</tr>
</tbody>
</table>


Men and women regret their choice approximately equally often. The average regret decreases significantly if the level of education increases. Graduates from vocational colleges in the Netherlands regret their choice much more than graduates from higher vocational education and university. There are several potential reasons for this difference. First, students who attend vocational colleges made education and vocational choices at an earlier age than students at higher vocational education and university. Readiness for their choice might, therefore, be less developed. Second, tracks in vocational education tend to be more specialised than tracks in higher education. Specialisation also increases the probability of an error. There is evidence that specialisation is indeed associated with more regret, but also that students who face more difficulties to make an adequate choice tend to choose courses that

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(20) The sample includes approximately 6,700 respondents. All graduates in the sample are included to compute this average.
are less specialised. Third, Borghans and Golsteyn (2006b) measured the ability to imagine the future, and find that this measure is correlated with cognitive ability. Also within educational levels there is a correlation between regret of a choice and cognitive abilities of the respondent.

The likelihood of regret is strongly related with the doubt students had at the point in time when they made their choice. Less than 10% of the students (\(^{(21)}\)) indicating they never doubted their choice report regret after graduation. About 20% of the students who made their educational choice half a year before the start of the education regret their choice later on. While approximately 30% of those who chose their education in the summer vacation before the start of the education, regret their choice. Also, regret is clearly related with the degree of doubt the students indicated to have. Of those students indicating they doubted their choice strongly, 49.7% regret their choice (Borghans and Golsteyn, 2005).

Figure 1 shows the development of regret per educational level for the period 1995-2003. At the vocational college level (MBO (\(^{(22)}\))) the percentage of graduates with regret has decreased during this period. Since regret at the vocational college level was high when the Dutch labour market was in a recession and decreased during the upswing, there seems to be a cyclical pattern. This might indicate that for these graduates, regret depends on being able to find adequate employment. At professional college (HBO) and University (WO), there is a gradual increase in the percentage of graduates regretting their educational choice.

Figure 1: Percentage of regret by educational level, graduation year 1995-2003

The results discussed so far are obtained from a sample of graduates 18 months after graduation.

\(^{(21)}\) Here, we refer to students from all educational levels, and from both vocational and general educations.

\(^{(22)}\) See the Annex for an overview of the Dutch educational system and the list of abbreviations.
graduation. An interesting question is whether graduates at the point in time when they were interviewed already have a good image of their occupation. If some consequences of their choice still have to appear, the average level of regret could increase even further. However, one can also imagine that people put the role of the specific education they followed into perspective after they worked for a longer period. Figure 2 gives – based on a representative sample of the Dutch population (\(^{(23)}\)) – an overview of the total Dutch population’s regret (\(^{(24)}\)). It appears that regret increases with years of experience. This indicates that 18 months after graduation, people cannot see all the consequences of their decision yet and that it takes a long time before they accomplish this. Some 10 years after graduation, the average level of regret stabilises around 30-40\%. Note that in this figure young and old cohort are compared. Older people, who graduated more than 40 years ago, tend to regret more their initial educational or vocational choice.

**Figure 2:** Regret of educational choice and years since graduation from initial education (vocational college or college education)

![Regret of educational choice and years since graduation from initial education](image)

Source: Enquête levenslang leren (ROA, 2004); Borghans et al. (2006).

### 2.3. The cost of regret

Borghans and Golsteyn (2006a) show that regretting an educational choice is an important incentive to change education (\(^{(25)}\)). Some students stop their education to switch to another, 

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\(^{(23)}\) Enquête levenslang leren (ROA, 2005).

\(^{(24)}\) Based on Borghans et al. (2006). Due to the limited size of the sample (2,400) we have taken a moving average of three years.

\(^{(25)}\) Freiden and Staaf (1973) find also that many students switched between educational fields.
while others realise the consequences of their choice after graduation. Some of students who regret their choice after graduation start a second education, which is more in line with their interests and capacities. Others put up with their decision and continue in the direction they have chosen. Probably some of them try to search for jobs which can turn their careers in a different direction. As far as people actually start a new education because they are not satisfied with the current education in retrospect, wrong educational choices are directly coupled to costs. Cunha et al. (2005) show also that remediation of inadequate early investments is difficult and very costly because skill attainment at one stage of the life cycle raises skill attainment at later stages of the life cycle (self-productivity) and skill begets skill through a multiplier process and hence early investments facilitates the productivity of later investments (complementarity).

Apart from erroneous educational choices, poor information about the future prospects of a chosen field of study also reduces the incentive to put effort in the study. Borghans and Golsteyn (2006b) show that students who have a less clear picture about their future study fewer hours per week and stay longer in school to postpone the transition from school to work. An important question that has not yet been studied is whether improved IAG indeed increases efforts of students while studying.

Learning at a later age may play an important role in adjusting educational choices made earlier in life. The possibility to change educational field during a later career phase, makes the labour market more flexible. Individuals can adjust their educational choice if they notice that the education they chose when they were young does not fit them or gives them for instance a lower wage than they expected. This implies that there are not only possibilities to prevent discrepancies between demand and supply by helping young children to make the right educational choice but also to diminish them by retraining adults.

These adjustments are not without costs, however (26). If educations at a higher age are indeed followed to correct earlier choices, it would be more efficient to have followed this education as soon as possible. As a consequence of the adjustment, the total time in education will increase and the graduate will become available for the labour market later or will experience some breaks in the work career.

With an average working life of 40 years, a one-year delay in education can be seen as a 2.5% capacity loss. Based on the international survey Cheers among graduates three years after graduation (approximately 3 500 graduates per country) a conservative estimate of capacity losses can be calculated for different countries. The costs are highest in Italy, Austria and Finland while the Czech Republic, France, Japan and Sweden have relatively low capacity losses (27). The high capacity losses in Italy are due to the fact that students take too long time to graduate. In Germany, Italy, the Netherlands and the UK many students continue

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(26) Based on Borghans and Golsteyn (2003).
(27) For a description of the method followed to calculate the costs we refer to Borghans and Golsteyn (2006c).
studying after they graduated from college education. This also reduces considerably the number of years they will work on average.

### Table 3: Costs of learning delay by countries

<table>
<thead>
<tr>
<th></th>
<th>Length education</th>
<th>Second education</th>
<th>Started late or delay during education</th>
<th>Total capacity loss as percentage of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT</td>
<td>7.6</td>
<td>1.1</td>
<td>1.2</td>
<td>9.9</td>
</tr>
<tr>
<td>CZ</td>
<td>2.3</td>
<td>0.3</td>
<td>0.5</td>
<td>3.1</td>
</tr>
<tr>
<td>DE</td>
<td>3.3</td>
<td>2.3</td>
<td>1.1</td>
<td>6.9</td>
</tr>
<tr>
<td>ES</td>
<td>2.4</td>
<td>1.3</td>
<td>0.8</td>
<td>4.5</td>
</tr>
<tr>
<td>FI</td>
<td>5.4</td>
<td>0.2</td>
<td>1.9</td>
<td>7.5</td>
</tr>
<tr>
<td>FR</td>
<td>1.1</td>
<td>1.3</td>
<td>0.6</td>
<td>3.0</td>
</tr>
<tr>
<td>IT</td>
<td>8.0</td>
<td>2.6</td>
<td>0.9</td>
<td>11.5</td>
</tr>
<tr>
<td>JP</td>
<td>0.4</td>
<td>0.0</td>
<td>0.0</td>
<td>0.4</td>
</tr>
<tr>
<td>NL</td>
<td>1.5</td>
<td>2.7</td>
<td>1.1</td>
<td>5.3</td>
</tr>
<tr>
<td>NO</td>
<td>2.4</td>
<td>0.7</td>
<td>1.4</td>
<td>4.5</td>
</tr>
<tr>
<td>SE</td>
<td>2.4</td>
<td>0.4</td>
<td>0.4</td>
<td>3.2</td>
</tr>
<tr>
<td>UK</td>
<td>0.2</td>
<td>2.6</td>
<td>1.1</td>
<td>3.9</td>
</tr>
</tbody>
</table>

Source: Cheers, 1999; Borghans and Golsteyn (2006a)

### 2.4. Timing of education

In a lifelong learning perspective not only the question whether people are able to select the right training courses and participate in learning that adequately enhances their skills, but also the question when to participate becomes important. In the survey among the Dutch population (*Enquête levenslang leren*, 2004), the question whether people in retrospect are satisfied with the period at which they followed the education is, therefore, included. We analyse the quality of the timing of the education by comparing answers of people in all age groups to the questions at which point in time they graduated and when they would have liked to have graduated in retrospect. From the data, we find that 28 % of the respondents rather would have graduated earlier, 37 % indicate that they would like to have graduated at the same time and 35 % indicate that they would like to have graduated later. Those who want to have graduated later appear to be mostly people who rather would have followed a higher education. Because higher educations take a longer time to finish, the endpoint of the education moves to a later point in time.

Many respondents who did not continue a higher education straight after high school indicate, however, they would like to have followed their education earlier. Figure 3 shows the relation between the actual age of graduation and the in retrospect preferred age of graduation. It appears from the figure that even people who graduated at a very high age indicate they
would like to have graduated before their 30th birthday.

This confirms that the majority of the people who follow an education at a later age do this because they find out too late how useful the education is to them and not because they think it is more useful to follow the education at a later age. This finding confirms that most people consider youth the most appropriate period to participate in education. Although a substantial number of people participate in education later in their career, they do not consider this timing as optimal. Apparently these are people who only recognised later what kind of education was most appropriate for them and decided to repair their earlier investment according to their new insights. More effective career guidance in their youth could have increased the probability of a more adequate educational choice at that time. Adult participation in education, therefore, reveals the need for vocational guidance among young people. Improvements in the educational choice when students are young could reduce the need for later repair and could thus lower the need for acquiring full qualifications later in life. This result applies no matter how education later in life is organised.

Figure 3: Average preferred and actual age of graduation from vocational college or college education

2.5. Can career guidance improve initial vocational choices?

Since it is apparently difficult for all students to imagine the consequences of their educational and vocational choices, a policy response could be to help them making their
choices by delivering IAG. But do such interventions produce the expected effect on the choice process?

### 2.5.1. High school students

A lot of evidence indicates a need for offering career guidance to students. Using qualitative research, Siann et al. (1998) and Buckham (1998) show that respectively Chinese and British college students tend to be very insecure and to know merely stereotypical things about their future professions. Sheperd-Johnson (2000) shows that a sample of students from Long Island, New York, generally reveal a shallow understanding of how school relates to the world of work and show limited awareness of the skills and knowledge needed for success in the future. Young people seem to think the factor which will lead to success is the possession of career-specific knowledge, which is partly contrary to modern labour-market demands.

In addition, counselling is highly demanded by students. Blanton and Larrabee (1999) report that 58% of US students aged 18-25 believe high schools are not doing enough to help them plan their careers. Based on an overview of the literature, Gordon (1998) identifies heterogeneous subtypes of undecided students for which specific career counselling strategies can be developed. Based on the level of decidedness (28) she defines seven groups of students and shows the different strategies for counsellors in each group. For instance, individuals with low goal instability are more satisfied with computerised treatments, whereas students with high goal instability are more satisfied with interpersonally oriented approaches.

From a Japanese sample, Nishada (1992) indicates that few students know what their future occupation will precisely look like and pleads for a larger influence of schools to give more specific examples of occupations (29). Davey (1993) finds for a sample of US high school students that nearly all of the respondents (93.4%) have some dreams about their future occupations. The main reason given for this was an expected lack of financial means to study. Borghans and Golsteyn (2006b) show from a Dutch sample that a very important aspect which determines the quality of the educational choice is the level to which students can imagine their future life. Less imagination induces students also to stay longer in school.

Psychologists typically use scales to measure the effect of interventions on the ability of subjects (students/workers, etc.) to form better pictures of their career. One widely known and internationally used scale is the career decision scale. It is a 16-item scale in which the individual indicates whether the characteristic is ‘like him’ or ‘not like him’ on a 4-point Likert response continuum. Higher scores on the scale indicate greater indecision (30). Using

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(28) Gordon (1998) uses this term to overview the literature because many researchers use similar terms to group their subtypes.

(29) This would require a close cooperation between schools and companies/workplaces.

(30) The reliability of the scale is measured by internal correlation of the scores on the items, Cronbach’s alpha, which is very high in most studies and therefore shows solid reliability (e.g. Osipow, 1987). Maguire
this instrument, for instance Betz and Klein Voyten (1997) find, using a US sample, that self-efficacy (i.e. the extent to which individuals think they can successfully make career decisions) and expectations about the usefulness of career exploration lead to greater certainty about careers. The latter scale scores how certain an individual is about his career. They find, as do for example Betz and Hackett (1986) for a US sample, that a lack of self-efficacy is an important predictor of career indecision. Post-Kammer and Smith (1985) draw a similar conclusion for different age-groups from a US sample. The counsellor may increase self-efficacy by giving information to the student about performance accomplishments, by helping students to enhance learning and manage anxiety, and by giving verbal encouragement. In addition, their study shows the importance of assessing and encouraging the students’ beliefs that career exploratory behaviour will lead to useful career development outcomes.

Also, many experiments have been done to assess the effect of career guidance. Employing an experiment in which a counsellor gave eight 50-minute lessons in 2 weeks to a treatment group, Kraus and Hughey (1999) find that treated female high school juniors in the Midwest scored significantly higher on career decision making self-efficacy than women in the control group, while no significance difference was found for men. Jurgens (2000) reports the effectiveness of two types of interventions on career certainty. One treatment consisted of a four-phase intervention: a two-hours decision-making workshop, a two-hours session on the Discover computer-system, a one-hour individual counselling session, and a two-hours professional forum in which the participants met with eight professionals to discuss occupations. A second treatment group only had the two-hour session on the computer-system and the individual counselling session. Both these treatments significantly increased career certainty. However, the four-phase treatment did not significantly outperform the two-phase treatment. Using an experiment on Taiwanese students, Peng and Herr (1999) find that career education courses have a positive impact on career decision-making. Wei-Cheng (1999) finds that computer based career guidance systems long lastingly increased vocational identity of students in the Midwest. Barnes and Herr (1998) find that individual counselling is a more powerful intervention than the Discover computer program.

Many other authors find that career-counselling at high school is effective in assisting high school children in the area of career development. Comparing results of various papers, Oliver and Spokane (1988) report that career intervention studies between 1950 and 1982 generally find a positive effect of career-counselling on career decision-making, understanding of careers and career-related adjustment. Interestingly, they find that guidance activities are most efficient before high school starts. Whinston et al. (1998) find for studies between 1983 and 1995 also positive, although smaller, overall effects of career intervention on career decision-making.

Hughey and Hughey (1999) argue that students should be taught already in high school how to cope with the changes which they will experience in their careers. Gillies et al. (1998) (2004) reports a recent discussion of measurement of the outcomes of career guidance.
analyse the impact of a career education intervention in upper elementary school. For 10 weeks, grade 6 Australian children were helped to acquire a better understanding of self in relation to the world of work and the diversity of life roles in which individuals engage. They find that children improved their knowledge about jobs and the personal attributes required for job success.

2.5.2. **Additional empirical evidence on the effects of career counselling from national studies**

Improving the picture students have about the future prospects of education and training will not only improve the chances of a good choice, but will also increase motivation for study. Borghans and Golsteyn (2006b), using a Dutch sample, indeed find evidence that students who are better able to imagine the future, study more hours per week, have a lower probability to drop out and finish their study earlier.

Krumboltz and Worthington (1999) explain that workforce preparation programmes seek besides vocational development indirectly to address a wide variety of other social problems through workforce preparation efforts, for example drop out rates, juvenile delinquency, teenage parenthood, drug abuse, psychological well-being.

Savickas (1999) concludes from numerous studies that youth cope better with the school to work transition if in high school they develop awareness of the choices to be made and of the information and planning that bear on these choices. He discusses the result of several longitudinal studies which examine the relation between the career development of high school students and detailed information about their adaptability to the world of work. One of these studies is Super’s career pattern study (Super, 1954; 1957), in which it is shown that about one-third of the respondents engaged in floundering and drifting (i.e. a random movement from one position that is not logical to the next) during most of the seven years after high school. At age 25, 80 % of the participants were stabilising, i.e. they had little doubts about their career path. Moreover, Savickas shows that to make a better career choice, important factors are the attitudinal qualities, i.e. the readiness of an individual to choose a career (e.g. positive attitude towards planning, independence in making choices, involvement in the career development process) and information one has about the world of work and the principles and practices of career decision-making.

George et al. (1992) argue that counsellors can become key persons in combating the dropout problem. A conservative estimate shows that at least 11 % of the US dropouts possess the ability necessary to complete high school. The reasons why people drop out are complex (familial, personal, socioeconomic factors, educational achievement and school behaviour), yet the signs of students at risk can be evident as early as the third grade. The authors indicate which steps counsellors can take to prevent dropping out (early identification of potential dropouts, support programmes for the identified, encouragement of the identified to engage in social activities related to the school) and how they can help students who dropped out, for example encouragement to enter work study programmes.
Palladino-Schultheiss (2005) argues that career interventions during elementary school are imperative for preventing disadvantaged to drop out and to stimulate them to continue in school. Rojewski and Kim (2003) show, using the US national educational longitudinal sample (NELS), that levels of occupations children aspired to were firmly established by the time they were in grade eight.

At many high schools, some form of help is offered to increase the quality of the educational choice. In Table 4, Borghans and Golsteyn (2005) compare students who regret their educational choice and those who are satisfied with their choice, and the extent to which they made use of help during their choice of education.

They use the ROA graduate survey’s 2005 supplement sample which contains information on 6,300 graduates both from high schools and all levels of college. In the survey, all respondents provide information about which high school they attended and which form of help they received at this high school.

When looking at individual differences between students (the left column in the table), it appears that students who talked with their parents or mentors about their options regretted their choice less often. An obvious reason for this relationship, however, is that especially students who need advise will talk to their mentor. So possibly the correlation does not show that talking to a mentor makes a student better off, but shows that students who face more problems in choosing talk to mentors more frequently. The question, therefore, arises whether students who talked to mentors would have made a better choice if they had not talked to them. In other words, the real question is not whether students visiting a study counsellor make better choices but whether a larger supply of study counselling facilities would improve the quality of the choice.

This causality problem can be avoided by looking at the provision of help and support for career choice at the school level. Schools differ in the help they offer. In schools that offer more facilities, students are more likely to make use of such facilities. Therefore, the use of facilities by the respondent’s fellow-students is analysed. This use of help does not indicate the respondent’s capability to make an adequate choice, but does give information about the policy of the school with respect to educational choice guidance (31).

It could also be that differences in use of guidance services are correlated with the socioeconomic background of the students. Therefore, with the second estimation technique we control for the average educational level of the parents of fellow-students per school.

Table 4 shows the results. The consequence of comparing differences between schools is that the effect of personal conversations with parents or mentors disappears. The only variable now having a negative effect on regretting the educational choice is the visit to the study

(31) This estimation technique is called two-stage least squares. We instrument the respondent’s use of help by his fellow-students’ use of help.
counsellor. Interestingly, Oliver and Spokane (1988) and Whinston et al. (1998) also report that individual counselling is most effective.

Table 4: Effects of high school (32) factors on regret

<table>
<thead>
<tr>
<th>Differences between students</th>
<th>Differences between schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>coefficient</td>
<td>Standard error</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Differences between students</th>
<th>Differences between schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>coefficient</td>
<td>Standard error</td>
</tr>
</tbody>
</table>

Lessons on educational and professional choice | -0.011 | 0.009 | -0.094 | 0.064

People came to speak about their professions | -0.007 | 0.010 | 0.040 | 0.044

Personal conversations with mentors | -0.014 | 0.009 | * | -0.143 | 0.106

Personal conversations with study counsellors | 0.002 | 0.009 | -0.178 | 0.064 | ***

Talked to parents about educational choice | -0.022 | 0.009 | ** | 0.557 | 0.718

Search for contact with people working or studying in interesting fields | -0.011 | 0.007 | -0.108 | 0.118

Test for educational or professional choice | -0.022 | 0.020 | 0.052 | 0.255

Extended documentation about educations and professions at school | -0.020 | 0.016 | -0.063 | 0.128

Subscription to magazine about educational choice | 0.057 | 0.032 | -1.216 | 0.844

Been to the educational choice meeting in Utrecht | 0.007 | 0.018 | -0.046 | 0.061

Professional guidance | 0.056 | 0.034 | -2.230 | 4.728

Number of times been to college information days | 0.006 | 0.004 | -0.062 | 0.078

Source: SIS supplement (ROA, 2005); Borghans and Golsteyn (2005).

*** = significant at 1 % niveau, **=significant at 5 %, *=significant at 10 %.

2.6. Conclusions on IAG to support initial choice

In Section 2, we have shown that there is a great need for IAG in the initial phase of the education. For a Dutch sample of graduates, we find that on average 21 % of the respondents

(32) High schools are the Dutch HAVO and VWO.
regret their educational choice 18 months after entering the labour market. Regret increases with years of experience. 10 years after graduation, the average level of regret stabilises around 30-40%. Regretting a choice is an important incentive to continue learning in a different discipline after graduation. The price of this continuation of learning is that people are not working at the time they are in education. These capacity losses are substantial and vary significantly between countries.

Besides the quality of the choice for a discipline, we also analyse whether people invest in their education timely. Our estimates confirm that the majority of the people who follow an education at a later age do this because they find out too late how useful the education is to them and not because they think it is more useful to follow the education at a later age. Adult participation in education, therefore, reveals the need for vocational guidance among young people. Improvements in the educational choice when students are young could reduce the need for later repair and could thus lower the need for acquiring full qualifications later in life.

There is abundant evidence that IAG helps to improve choices in initial education. We show that visiting a study counsellor is an effective method to decrease the probability of regretting the education.
3. IAG and continuing learning

3.1. IAG decisions over the life cycle

With the increasing importance of lifelong learning the question arises in what way traditional IAG has to be adjusted to the fast changing work environments and the end of linear career paths. This new environment not only influences the choice of a vocation when being young, but also investments in training and learning by doing during working and adult life. The need for career counselling for adults has, therefore, recently gained much focus on policy agendas. Watts (1996) stresses the need for lifelong career counselling to make a new concept of career accessible to all. Careers are no longer an orderly progression up a hierarchical ladder within an organisation or profession, but rather an individual’s lifetime progression in learning and work. The fast moving economy in which people have to change tasks often in their lives, calls for a three-prong strategy which entails career counselling as an integral part of all education provision, all employment provision and access to neutral career guidance when individuals wish to review opportunities to move between educational institutions or employers.

Ohsako (2000) argues that counselling can play an important role in lifelong learning. Among others, counselling can stimulate adults to learn, provide customised guidance through the overwhelming amount of information about learning, promote their self-efficacy, help workers to learn at the workplace and remove learning barriers.

In addition, many older workers thought, when they started their careers, that the skills they acquired during initial education and training would last until retirement. These people are now often confronted with more complex work environments, to which they have to adjust. Simon and Osipow (1996) argue that despite the obvious need to assist them by counselling only few theories (e.g. Super’s life-career rainbow) have addressed this issue. According to Simon and Osipow, counselling interventions for the older adult can be grouped into three areas of assistance:

(a) helping people to find connections among various personal life events and personality changes;
(b) helping them find the general themes in their career and patterns of work preferences;
(c) using the first two, help individuals to becoming aware of the future.

In this way, people may become more aware of their vocational identity even confronted with fragmented professional careers and may become more satisfied with their careers, with aging and retirement.

Beijan and Salomone (1995) proposed that a sixth stage should be added between Super’s
late establishment and early maintenance stage, called career renewal. According to these authors, many adults in their 40s undergo a state of instability strong enough to be called a (midlife) crisis, in which they feel compelled to choose the alternative they prefer regarding vocational, religious, political questions. The individual perceives a loss of self, forcing to find a new self-concept by expressing aspects of the personality previously undeveloped. Many adults are then questioning the purpose of their vocational and personal life and looking for meaningful goals for the future. Counselling can help these people to choose among three alternatives:

(a) renew a commitment to their careers by updating skills and developing new competences;

(b) alter their lifestyle to devote more time to leisure and family and merely maintain work skills to stabilise their career;

(c) change careers and then concentrate on the establishment stage tasks.

Niles et al. (1998) analyse how adults use exploration (i.e. learning more about oneself and one's situation) to cope with career development tasks. Mentors, peers, or other resources might be useful to them in their exploration. Using the adult career concern inventory on a sample of US adults, they grouped respondents into three clusters, which helped career counsellors to identify the exploratory needs of their clients regarding their career. The first cluster was exploring to maintain their current position until retirement. People in this cluster wanted to solve problems in their current workplace, for example getting more social support and identifying new skills to acquire for their current jobs. The second cluster used exploratory behaviour to access to new occupations or re-enter the workforce. Career counselling for re-entering women, focused then on similar issues as with adolescents exploring for the first time, although they were on average 33 years old. For people in this cluster expressing the need to change to make a fresh start, career counselling focused on helping to gain a realistic image of career beliefs. In short, career counselling with people from the second cluster focused on identifying values, interests and transferable skills. The third cluster was exploring to innovate and move ahead. They want to make progress in their careers or find new ways to do the old things. Career counsellors found for one subject in this cluster that instead of changing occupation, she needed to change job from being a nurse to a nursing position at a local substance abuse centre.

Guidance may even be relevant for adults in the latest stage of their career. Among others, Liptak (1990) shows that counselling can help individuals who plan for retirement to be more successful in coping with the transition.
3.2. IAG in training and learning by doing

3.2.1. Training

Colquitt et al. (2000) discuss individual factors (e.g. anxiety, locus of control, self-confidence, self image) which may increase the incidence of training. In a recent paper, Borghans and Golsteyn (2006d) show that there are several reasons why later investments are more complex for individuals to be made. Once people have left initial education, most of their time is spent on other activities than learning in formal settings, so in this environment it will be less obvious to think about learning opportunities. A school offers uniform and consistent curricula. Training for further development and maintenance however requires that people select specific courses, based on their capabilities and skill shortages, therefore requiring much more self-knowledge.

The line of argumentation that older people will be facing more trouble when choosing what to learn should not be confused with our earlier argument that older people know more about their lives and hence possess better information that would have been relevant for choices in the past. Older people know better what kind of learning in the past would have been relevant for them during their career, but the decision about how to continue learning becomes more difficult since their learning environment becomes vaguer and, therefore, much more complicated.

Table 5 provides information for the frequency of regret of training participation, on average 1.5 year after finishing the course \(^{33}\). The table shows that there is only a small difference in regret between men and women. Also when comparing education background, the differences are not large. The major exceptions are people with only primary education. In this group about 27% of all participants in training courses regret the participation afterwards \(^{34}\). There is a very sharp distinction, however, between workers who receive feedback from their manager about their development and support from their firm to participate in training and those who do not. Only 10.8% of the workers who are supported by their firm to work on their development regret their training participation, while among others this percentage equals 19.8%. This suggests that support or guidance by the manager or other professionals might be very important for choosing the right training course.

Table 5: Percentage workers who regret the training they participated in, by gender, educational background and extent of support of the employer.

\(^{33}\) This information is taken from the Survey ‘Levenslang Leren,’ in which a representative sample of the Dutch population is interviewed. The sample contains 2 400 respondents.

\(^{34}\) This may be due to the fact that people with primary education have only a limited spectrum of training opportunities afterwards and those mainly at lower levels.
<table>
<thead>
<tr>
<th></th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>16.3</td>
</tr>
<tr>
<td>Women</td>
<td>17.2</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Educational background</strong></td>
<td></td>
</tr>
<tr>
<td>Primary school</td>
<td>26.9</td>
</tr>
<tr>
<td>Low secondary (VMBO)</td>
<td>18.7</td>
</tr>
<tr>
<td>High secondary (HAVO/VWO)</td>
<td>15.4</td>
</tr>
<tr>
<td>Vocational college (MBO)</td>
<td>14.5</td>
</tr>
<tr>
<td>Higher vocational education (HBO)</td>
<td>15.1</td>
</tr>
<tr>
<td>University (WO)</td>
<td>18.6</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Support from employer</strong></td>
<td></td>
</tr>
<tr>
<td>Little or no feedback</td>
<td>19.8</td>
</tr>
<tr>
<td>Substantial feedback from manager</td>
<td>10.8</td>
</tr>
<tr>
<td>Total</td>
<td>16.7</td>
</tr>
</tbody>
</table>

*Source: Enquête levenslang leren (ROA, 2004); Borghans et al. (2006).*

In 2003 the Eurobarometer included several questions about lifelong learning (see also Cedefop, Chisholm, 2004). In one of these questions the respondents where asked to mention three likely obstacles for taking part in training. Among the alternatives the respondents could answer ‘I do not know what I could do that would be interesting or useful’. Figure 4 shows that the probability of answering that good information about what could be useful is lacking, is clearly related to age. From about 40 years on, the fraction of workers that indicates that they do not know what kind of course to follow steadily increases.

*Figure 4: Fraction of workers indicating that having access to good quality information and advice tailored to their needs would encourage them to take up studies or training by age*
Table 6 provides the same information per country, distinguishing workers younger and older than 40 years. In the group of workers younger than 40 years, the fraction not knowing what kind of course to follow is low in all countries, varying from 1.3% in Greece to 7.9% in West Germany. Among the older workers, there are many more who do not know what training could be useful, but also the variation between countries is much larger. In Iceland only 5% of the workers older than 40 indicate that they do not know what course to participate in. Also in Greece, Norway and Sweden this percentage is less than 10%. In East Germany, Spain, Italy and Portugal more than 20% of the workers older than 40 indicate not to know what training could be useful.

Table 6: Fraction of workers indicating that having access to good quality information and advice tailored to their needs would encourage them to take up studies or training, by country and age group (younger than 40 versus older than 40).
### Table: Learning by doing

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage under 40</th>
<th>Percentage over 40</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT Austria</td>
<td>4.4</td>
<td>15.2</td>
</tr>
<tr>
<td>BE Belgium</td>
<td>5.8</td>
<td>14.1</td>
</tr>
<tr>
<td>DE (E) East Germany</td>
<td>6.0</td>
<td>20.2</td>
</tr>
<tr>
<td>DE (W) West Germany</td>
<td>7.9</td>
<td>15.3</td>
</tr>
<tr>
<td>DK Denmark</td>
<td>3.1</td>
<td>11.8</td>
</tr>
<tr>
<td>EL Greece</td>
<td>1.3</td>
<td>8.4</td>
</tr>
<tr>
<td>ES Spain</td>
<td>4.1</td>
<td>20.3</td>
</tr>
<tr>
<td>FI Finland</td>
<td>2.8</td>
<td>14.5</td>
</tr>
<tr>
<td>FR France</td>
<td>5.1</td>
<td>18.6</td>
</tr>
<tr>
<td>IE Ireland</td>
<td>6.8</td>
<td>16.0</td>
</tr>
<tr>
<td>IS Iceland</td>
<td>4.9</td>
<td>5.0</td>
</tr>
<tr>
<td>IT Italy</td>
<td>3.8</td>
<td>22.1</td>
</tr>
<tr>
<td>LU Luxembourg</td>
<td>5.8</td>
<td>10.4</td>
</tr>
<tr>
<td>NL Netherlands</td>
<td>3.8</td>
<td>11.9</td>
</tr>
<tr>
<td>NO Norway</td>
<td>1.7</td>
<td>7.4</td>
</tr>
<tr>
<td>PT Portugal</td>
<td>4.1</td>
<td>21.6</td>
</tr>
<tr>
<td>SE Sweden</td>
<td>3.0</td>
<td>9.7</td>
</tr>
<tr>
<td>UK (GB) Great Britain</td>
<td>6.3</td>
<td>14.9</td>
</tr>
<tr>
<td>UK (NIE) Northern Ireland</td>
<td>5.3</td>
<td>17.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4.5</strong></td>
<td><strong>14.7</strong></td>
</tr>
</tbody>
</table>

*Source: Eurobarometer 59.0 (January-February, 2003).*

### 3.2.2. Learning by doing

From this evidence, we can conclude that many people do not seem to know which training they can learn from most. Therefore, the task for an employer or counsellor to advice the worker becomes crucial. IAG in the form of a manager guiding employees to benefit from learning opportunities related to work is also plausibly much more important than help offered to choose courses.

Mentoring can thus be an efficient way to provide counselling within an organisation. A mentor is often defined as a person a few levels ahead in the organisation who lends support to a less experienced worker. Mentoring relationships can be very beneficial for the worker in terms of promotions, salary increases, career satisfaction as among others Chao et al. (1992), Kram (1985), Turban and Dougherty (1994) and Dreher and Cox (1996) report. However, Scandura (1998) shows there may be also negative aspects of (bad) mentoring. Murphy and Ensher (2001) stress that not all mentoring relations are effective. They define three mentoring types:

(a) direct support to enhance the protégé’s career;
In relation to this, Chao et al. (1992) show that support is most effective if it is informal. Murphy and Ensher (2001) use a sample of 31-50 year old people who work in a media organisation. They find using a sample of US West coast media organisation and school district that there is an important positive effect of mentoring support on career outcomes, for example job satisfaction and perceived career success, but only if there is direct support to enhance the career of the worker. When there is psychosocial support or when the mentor acts as a role model there is no effect on job satisfaction or perceived career success.

The relative importance of training as regard learning-by-doing is an important issue in the discussion of the relevance and kind of IAG to be given during working life. While in training courses, people spend some time outside their work environment to learn, learning-by-doing is characterised (Arrow, 1962; Rosen, 1972; Killingsworth, 1982; Jovanovic, 1995) by the fact that work activities are used to learn. Even without the purpose to learn, many work activities will make the worker learn. This can be intensified by selecting the tasks for a worker to promote his learning. Borghans et al. (2006) calculate that 94% of learning on the job is related to learning-by-doing while only 6% of the learning time is concerned with following courses and training. Learning by doing is more prominent when people are young, but is still very relevant among older workers. Younger workers spend approximately 40% (**35**) of their time on tasks from which they learn. This gradually decreases when people gain experience. Older workers however still spend 25% of their time on tasks from which they learn. Training participation is also much more concentrated among younger workers, as is shown in Figure 5. In the age group 25-27 a large share of learning on the job is training. Around the age of 30 about 15% of the learning time is in education or training. When people become older this share decreases, and the importance of learning-by-doing increases.

Note that this percentages refers to the total amount of learning time relative to total time on the job, while the earlier mentioned 94% refers to the time people spent on learning-by-doing relative to the total learning time.
Figure 5: The fraction of the time spent in training relative to total learning time

3.3. Timing of training

Regret of the timing of training differs substantially from regret of the timing of education. Among those who participated in a training course (36), about 50% indicates that if they could choose again they would have participated in this course in another period of time. Almost everyone who indicates that the timing was not adequate say that they would have preferred to follow the same training earlier. Figure 6 shows how many years earlier those who wanted to follow a course at another point in time would have wanted to follow the course. The figure shows that the difference between the preferred and actual timing of the course is larger for older people. Around 55 years of age, people indicate that on average they would have liked to follow the course 15 years earlier. This indicates that especially elderly people follow courses, which they, in retrospect, would have liked to have followed much earlier. On average these people who indicate that it would have been better to follow the training earlier, do not prefer this course to be followed very early in their career, but only prefer an earlier stage in their working career.

(36) Participation in training is defined by the question ‘how many courses or training did you complete in the past two years.’
This finding suggests that for people to consider counselling participation during their working career is useful. It seems that many workers realise only late that a certain course could be useful to them. They first seem to need certain work experience to understand the need for a training that would have been more efficient when participation had anticipated the need for these skills.

3.4. Conclusions on IAG to support further learning

In this section, the need for IAG when people continue learning after initial education is discussed. We argue that these later investments are more complex for individuals to be made and that there is, therefore, a great need for IAG. Our evidence suggests that an important way to provide IAG may be managers helping their employees to make the right decisions concerning which courses to choose or which tasks to focus on. Evidence shows that the role of a manager helping or guiding his employees is crucial. Only 10.8 % of the workers who are supported by their firm to work on their development regret their training participation, while among others this percentage equals 19.8 %. From about 40 years on, the fraction of workers indicating that they do not know what kind of course to follow steadily increases.
4. Summary of findings and implications for policy and research

4.1. Summary of findings

The aim of this research is to provide a framework for thinking about the effect of IAG in a lifelong learning perspective, to overview the literature in this field and to provide empirical information for the US and European countries, with a special focus on the Netherlands.

Our framework for thinking about IAG in a lifelong learning context starts with a discussion about the reasons for lifelong learning. We argue that to understand the role of IAG in a lifelong learning perspective it is important to look at the economic reasons why people learn at a later age. We show that there are three reasons why people spread learning investment over their life-cycle:

(a) specific skills might depreciate rather fast, but because they are complements to more general skills, it is worthwhile to keep investing in renewing these skills;

(b) economic or technological shocks on the labour market may make it necessary to invest in new skills;

(c) misguided educational choices in the past might lead to reparation of these previous educational investments.

As we will argue in the section below, it is important to note that the different reasons for lifelong learning lead to different requirements for IAG.

Improvements in IAG throughout the whole career can improve the efficiency of the VET system. We argue throughout the report that there are three reasons why adequate IAG has become of growing importance:

(a) since VET is closely linked with specific occupations, choices regarding participation in education and training are associated with a higher risk. People can make ‘misinvestments’ because economic conditions can change and alter the value of specific skills in the labour market. Research (e.g. Jovanovic, 1979) has shown however that a large fraction of such misinvestments is related to a mismatch between an occupation and people’s personal capabilities and preferences. Somebody chooses to be schooled for a certain profession because he/she expects that this job will suit him/her, but experiences later that this choice was based on a misconception. Borghans and Golsteyn (2006a) show that 20-40 % of all Dutch workers who left education indicate that they would have chosen another field of study if they could choose again. Many of them actually decide to go back to education. In this report we have shown estimates of the costs of these reinvestments for several European countries. The estimates vary between 3.2 % (France) and 11.5 % (Italy) of the total labour costs in these countries. Throughout this
report, we showed that IAG plays an important role in improving choices with respect to education and training;

(b) with the growing importance of lifelong learning, similar participation decisions regarding education and training have to be made throughout the whole career. There are several reasons why these later investments are more complex for individuals to be made. Borghans and Golsteyn (2006d) show for instance that many people do not know which courses to take to reduce skill deficiencies at work. Once people have left initial education, most of their time is spent on other activities than learning, so in this environment it will be less obvious to think about learning opportunities. Schools offer uniform and consistent curricula, but training for further development and maintenance requires that people select specific courses, based on their capabilities and frailties, therefore requiring much more self-reflection. Finally, since learning by doing contributes substantially to the acquisition of skills of people who are working, the work environment and possibilities for learning at work have to be taken into account in training decisions. People who are supported by their manager to participate in training and receive adequate feedback for development make substantially less errors in their training participation decisions;

(c) finally, the very nature of lifelong learning also implies that people have to decide about the optimal timing of training participation. Recent survey results show that apart from which kind of training to participate in, people also face serious difficulties in deciding when to take part in these courses. Many respondents indicate that, looking back at previous training participation, they would prefer a different timing of the same course (Borghans and Golsteyn, 2005). IAG is an important policy instrument to assist people in making these difficult choices and, therefore, to increase the efficiency of the VET system. Recent research has shown the benefits of such policies (e.g. Bimrose et al., 2004; Bosley et al., 2002; Killeen et al., 1994; Mayston, 2002).

4.2. Implication for policy and research

At the European level, the policy framework for guidance and counselling is set in the Council resolution of 2004 (37). The council defines guidance as follows: ‘in the context of lifelong learning, guidance refers to a range of activities that enables citizens of any age and at any point in their lives to identify their capacities, competences and interests, to make educational, training and occupational decisions and to manage their individual life paths in learning, work and other settings in which these capacities and competences are learned and/or used.’

The importance of the role of guidance is reflected (among others) in the following quote:

‘guidance can provide significant support to individuals during their transition between levels and sectors of education and training systems and from school to adult and working life; to young people re-entering education or training after leaving school early; to persons re-entering the labour market after periods of voluntary or involuntary unemployment, or homemaking; to workers where sectoral restructuring requires them to change the nature of their employment; and to older workers and migrants.’

Our report also stresses that IAG is extremely important throughout the life of an individual. The main contribution of this report is that we have provided a new framework for thinking about lifelong learning and that we regard the role of IAG in the light of this framework. As noted in the section above, the report identifies three reasons for lifelong learning. These reasons lead to different requirements for IAG:

(a) when people learn at a later age to upgrade depreciated skills, the role of IAG is to provide information about the way in which their skills can be updated;

(b) due to economic or technological shocks, information is needed about the new employment opportunities that might provide alternatives to people facing a decrease in demand in their own sector,

(c) reparation of misguided initial educational choices asks for improved IAG for young people to improve their picture of their future working life to avoid misguided educational choices.

There is evidence that a large share of participation in education among adults is related to the reparation of previous erroneous decisions or unexpected shocks in the labour market. As far as guidance can help people to avoid these misinvestments, improved IAG could reduce costly reinvestments later during the career. Although there is ample evidence that young workers lack an adequate picture of the future working life, there is not yet much known about the way in which the image of the future can be efficiently improved. From what is known about the problems students face when making an educational and vocational choice, policies that stimulate students to create a realistic picture of their future working life, seem to be promising.

In the area of research, a lot of work remains to be done as well. Analyses based on cross-sectional information about differences in the way students gather information might lead to biased results, since students who face problems with making a choice follow other strategies than students who are better able to handle these difficult choices. Randomised experiments with approaches to assist students in their choices, following them sufficiently long to monitor the effects, are therefore a promising way to improve our knowledge about tools to effectively help students. In this way it can be systematically investigated which concrete forms of IAG are most effective, while also the size of the impact of these policies on mismatch and misinvestments can be quantified.
### The Dutch educational system

<table>
<thead>
<tr>
<th>High school</th>
<th>Further education</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (VWO)</td>
<td>University (WO)</td>
</tr>
<tr>
<td>6 years</td>
<td>5 years</td>
</tr>
<tr>
<td>Intermediate (HAVO)</td>
<td>Professional college (HBO)</td>
</tr>
<tr>
<td>5 years</td>
<td>4 years</td>
</tr>
<tr>
<td>Low (VMBO)</td>
<td>Vocational college (MBO)</td>
</tr>
<tr>
<td>4 years</td>
<td>Apprenticeship</td>
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<td></td>
<td>1-3 years</td>
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## List of abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cheers</td>
<td>Careers after higher education: a European research study</td>
</tr>
<tr>
<td>HAVO</td>
<td><em>Hoger algemeen voortgezet onderwijs</em> [Senior general secondary education (5 years, age 12-17)]</td>
</tr>
<tr>
<td>HBO</td>
<td><em>Hoger beroepsonderwijs</em> [Higher professional education (4 years, age 18-22)]</td>
</tr>
<tr>
<td>IAG</td>
<td>Information, advice and guidance</td>
</tr>
<tr>
<td>MBO</td>
<td><em>Middelbaar beroepsonderwijs</em> [Senior secondary vocational education (4 years, age 16-20)]</td>
</tr>
<tr>
<td>SIS</td>
<td><em>Schoolverlaters informatie systeem</em> [School leaver information system]</td>
</tr>
<tr>
<td>VET</td>
<td>Vocational education and training</td>
</tr>
<tr>
<td>VMBO</td>
<td><em>Voorbereidend middelbaar beroepsonderwijs</em> [Pre-vocational education (4 years, age 12-16)]</td>
</tr>
<tr>
<td>VWO</td>
<td><em>Voorbereidend wetenschappelijk onderwijs</em> [Pre-university education (6 years, age 12-18)]</td>
</tr>
<tr>
<td>WO</td>
<td><em>Wetenschappelijk onderwijs</em> [University education (4 years, age 18-22)]</td>
</tr>
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</table>
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