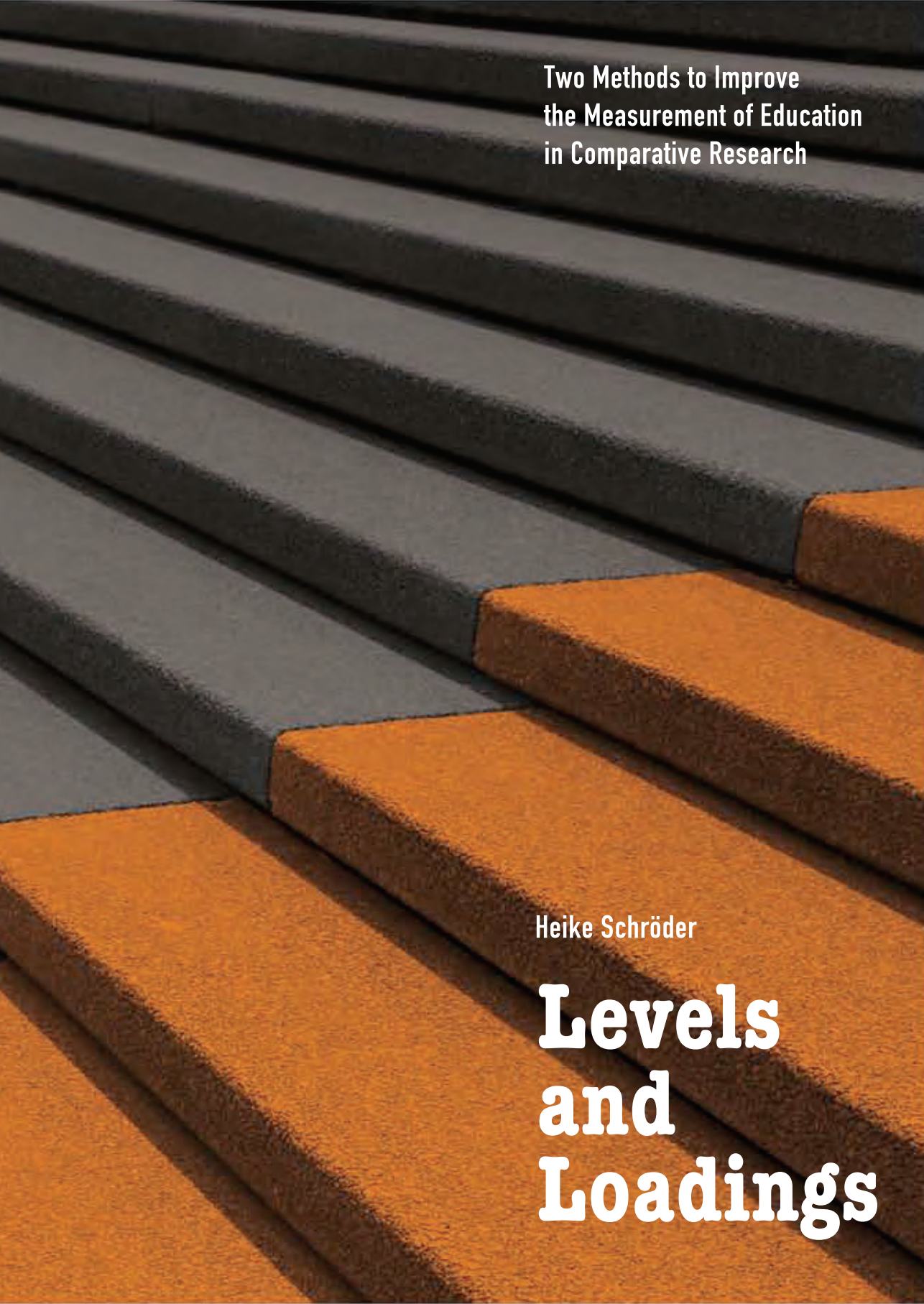


Two Methods to Improve the Measurement of Education in Comparative Research

Heike Schröder

Levels and Loadings

LEVELS AND LOADINGS

Two Methods to Improve the Measurement of Education in Comparative Research

Heike Schröder

VRIJE UNIVERSITEIT

LEVELS AND LOADINGS

Two Methods to Improve the Measurement of Education in Comparative Research

ACADEMISCH PROEFSCHRIFT

ter verkrijging van de graad Doctor aan
de Vrije Universiteit Amsterdam,
op gezag van de rector magnificus
prof.dr. F.A. van der Duyn Schouten,
in het openbaar te verdedigen
ten overstaan van de promotiecommissie
van de Faculteit der Sociale Wetenschappen
op vrijdag 25 april 2014 om 13.45 uur
in de aula van de universiteit,
De Boelelaan 1105

door

Heike Schröder

geboren te Gardelegen, Duitse Democratische Republiek

promotoren: prof.dr. H.B.G. Ganzeboom
prof.dr. M.C. Mills

beoordelingscommissie: dr.S. Schneider (Universität Mannheim)
prof.dr. C. Wolf (Universität Mannheim)
em.prof.dr. W.E. Saris (Universitat Pompeu Fabra, Barcelona)
prof.dr. P.G. de Graaf (Universiteit van Tilburg)
prof.dr. B.F.M. Bakker (Vrije Universiteit Amsterdam)

Table of Contents

List of Tables

List of Figures

List of Appendices

List of Acronyms

CS:	country-specific
DEGREE:	ISSP harmonization: 7 categories
EDU:	education level respondent: latent variable
EDDUR:	duration of education respondent
EDLVa/b/cXX:	country-specific education level respondent ESS R1-4
EDLVFa/b/cXX:	country-specific education level father ESS R1-4
EDLVMa/b/cXX:	country-specific education level mother ESS R1-4
EDLVPa/b/cXX:	country-specific education level partner ESS R1-4
EDLVdXX:	country-specific education level respondent ESS-R5
EDLVFdXX:	country-specific education level father ESS-R5
EDLVMdXX:	country-specific education level mother ESS-R5
EDLVPdXX:	country-specific education level partner ESS-R5
EDUCYRS:	duration of education respondent ISSP
EDULVL:	ESS-harmonization (ISCED-97) respondent: 7 categories
EDULVLa:	ESS-harmonization (ISCED-97) respondent: 5 categories
EDULVLb:	ESS-harmonization (ISCED-11) respondent: 27 categories
EDULVLF:	ESS-harmonization (ISCED-97) respondent: 7 categories
EDULVLFa:	ESS-harmonization (ISCED-97) father: 5 categories
EDULVLFb:	ESS-harmonization (ISCED-11) father: 27 categories
EDULVLM:	ESS-harmonization (ISCED-97) mother: 7 categories
EDULVLMa:	ESS-harmonization (ISCED-97) mother: 5 categories
EDULVLMb:	ESS-harmonization (ISCED-11) mother: 27 categories
EDULVLP:	ESS-harmonization (ISCED-97) partner: 7 categories
EDULVLPa:	ESS-harmonization (ISCED-97) partner: 5 categories
EDULVLPb:	ESS-harmonization (ISCED-11) partner: 27 categories
EDUYRS:	duration of education respondent ESS
EISCED:	alternative harmonization measure in ESS, respondent
EISCEDF:	alternative harmonization measure in ESS, father
EISCEDM:	alternative harmonization measure in ESS, mother
EISCEDP:	alternative harmonization measure in ESS, partner
ESS:	European Social Survey
EVS:	European Value Studies
FOCC:	occupation father: latent variable
ISCED:	International Standard Classification of Education
ISEI:	International Socio-Economic Index of Occupational Status
ISLED:	International Standard Level of Education
ISO:	International Organization for Standardization: country codes
ISSP:	International Social Survey Programme

MOCC:	occupation mother: latent variable
OCC:	occupation respondent: latent variable
OCC1:	first occupation respondent: latent variable
OPTI:	optimized scale score before transformation into ISLED
PDEGREE:	ISSP harmonization: 7 categories - partner
PEDU:	education partner: latent variable
PEDDUR:	duration education partner
PEDUCYRS:	duration education partner: ISSP
PEDUYRS:	duration education partner: ESS
PISLED:	International Standard Level of Education partner
RMSEA:	root mean square of approximation (SEM fit-measure)
SEM:	structural equation modelling
TDEGREE:	True score DEGREE in Saris-Andrews model, respondent
TEDDUR:	True score duration in Saris-Andrews model, respondent
TISLED:	True score ISLED in Saris-Andrews model, respondent
TPDEGREE:	True score DEGREE in Saris-Andrews model, partner
TPEDDUR:	True score duration in Saris-Andrews model, partner
TPISLED:	True score DEGREE in Saris-Andrews model, partner
XX:	ISO-country-code (e.g. FR=France)

Chapter 1

Overview, Results and Discussion

Chapter 1

Overview, Results and Discussion

1.1 Introduction

Education is a central variable in the social science research and plays an important part in numerous theories, models and analyses. To begin with, the role of education in society is the focus of a number of theories on mechanisms of social stratification, such as human capital theory (Becker, 1964), status attainment theory (Blau & Duncan, 1967), signalling theory (Spence, 1973), filter theory (Arrow, 1973), screening theory (Stiglitz, 1975), cultural reproduction theory (Bourdieu & Passeron, 1977), institutional theory (Meyer, 1977) and credentialism (Brown, 1995). In these theories education figures as an input and as an output variable. As an input variable it produces a wide range of objective and subjective effects. Most importantly, education affects a number of socioeconomic outcomes, such as employment, occupation, income, prestige and partner (e.g. Blau & Duncan, 1967; DiMaggio & Mohr, 1985; Allmendinger, 1989; DiPrete & Grusky, 1990; Ultee & Luijkx, 1990; Mare, 1991; Müller & Shavit, 1998; de Graaff, 1998; Bills, 2003; Ganzeboom & Treiman, 2004; Shavit & Blossfeld, 1993). Apart from these direct stratification effects education impinges on many other aspects of people's lives too, such as health (e.g. Ross & Wu, 1996; Rutter, Tizard, & Whitmore, 1981), crime (e.g. Lochner, 2004), family stability (e.g. Duncan & Duncan, 1969), mortality (e.g. Lleras-Muney, 2005), cultural participation (e.g. Bourdieu & Passeron, 1977), knowledge (e.g. Hyman, Wright & Reed, 1975), values (e.g. Hyman & Wright, 1979; Inglehart, 1971) and attitudes (e.g. Brint, 1984; Davis, 1982). As an output variable education is not simply the resultant of individual characteristics, such as effort, intelligence and interest but reflects parental education and occupation levels. Numerous studies have confirmed the effect of parental background on educational attainment (e.g. de Graaf, 1993; Mare, 1981; Breen & Jonsson, 2005; Erikson & Goldthorpe, 2008). When not thematic itself education is, moreover, frequently used as control or background variable.

Given the pivotal role of education in many research questions, its measurement quality is of critical importance and has direct consequences for the outcomes of statistical analyses. Accurate regression coefficients can only be obtained if sufficient levels of validity and reliability are assured. The measurement of the education variable therefore requires the same level of care as that of other

variables, such as for example social attitudes. This is all the more true when education is used in comparative research, i.e. research that either compares countries with different educational system, or between periods within countries in which the educational systems have changed. Surprisingly, however, not much care seems to be devoted to the measurement of education in comparative designs. Still, some studies have recognized the importance of the measurement of the education and provide guidelines on how best to proceed. Several international classifications for the measurement of education have been proposed, such as ISCED [1], the International Standard Classification of Education (UNESCO, 2006) and the CASMIN scheme, developed in the Comparative Analysis of Social Mobility in Industrial Nations project (Brauns, Scherer & Steinmann, 2003). Other studies have assessed the measurement quality of these comparative education variables (e.g. Kerckhoff & Dylan, 1999; Kerckhoff, Ezel & Brown, 2002; Kerckhoff, 1999; Schneider & Kogan, 2008; Schneider, 2009, 210; Braun & Müller, 1997) and have highlighted the importance of high measurement standards and the consequences of a lack thereof.

The topic of this dissertation is the measurement quality of the education variable in comparative survey research. Rather than merely assessing it, the studies assembled here demonstrate that the measurement quality of existing comparative education variables can actually be improved. The analyses provide an indication of how much can be gained in terms of regression coefficients and explained variance if conventionally used methods of comparative measurement, such as common denominator harmonization [2] or the use of a duration measure, are complemented or combined. The results illustrate how important it is to be aware of the pitfalls of conventional measurement practices and that an improvement on the current state of the art in comparative measurement is not just a luxury problem.

The quality of any measure in a survey is the result of two distinct processes: data collection and data analysis. As data collection is the primary process, which by definition precedes any analysis, the ultimate measurement quality of a variable is bounded by the quality of the original data. The problem, moreover, remains that analysts who simply want to use a given data set usually have no influence on the data collection whatsoever and have to make do with what

1 ISCED was first launched by UNESCO in 1976 for a limited number of OECD countries and then revised in 1997. Our discussion refers to ISCED-97. Recently, a revision has been launched, ISCED-2011.

2 Common denominator harmonization means that the number of categories found in country-specific variables is reduced to the categories all countries have in common.

they happen to find in the data. As existing data cannot be recollected, what is needed instead are ways to improve measurement quality that circumvents problems originating in the data collection process. This dissertation attempts to do exactly that: to fill this gap and provide researchers with analytical tools to improve the quality of the education variable after data collection, post-hoc as it were. Despite its secondary nature, data analysis does in fact offer various ways to compensate for or refurbish weaknesses found in the measures as they were originally collected or processed. The potential of such secondary analytical means to improve the education variable, as will be explained below, also has important repercussions for the collection of data. In particular, two different methods are proposed here, both of which rely upon the maximal exploitation of all information contained in existing data.

The first method, optimal scaling, exploits all the details contained in the original country-specific measures, which tend to contain much more detail than their harmonized counterparts. The scaling process results in a novel continuous education measure, labelled the International Standard Level of Education [ISLED] (Schröder & Ganzeboom, 2014). ISLED is a continuous measure that can be used instead of conventional comparative education measures, with the promise of yielding more accurate structural coefficients in statistical analyses. While in principle any categorical education variable can be optimally scaled, the quality of the derivative will critically depend upon the number of categories distinguished in the source variable. The more categories the respective source variable contains, the better its scaled derivative will be.

The second method, latent variable modelling, relies upon the exploitation of all information contained in two different indicators. The improvement in measurement quality is achieved by of model of error correction. Such error correction is not possible if only one indicator is used and is rather dependent on the availability of a second independent indicator. If such a second indicator is available (even if it is an inferior measure), latent variable modelling produces a measurement quality equal or superior to that of any single indicator, including ISLED. Compared to optimal scaling, the applicability of latent variable modelling is somewhat more limited, because it is not universal practice in surveys to collect the two required independent measures. If two measures are available, however, the potential of the method to improve measurement quality can hardly be overestimated. While optimal scaling and latent variable modelling are two independent methods, in order to obtain the best possible results, they may also be combined. The aim of both methods is to improve the measurement quality of the education variable in order to obtain accurate regression coefficients.

1.2 Conventional approaches to the measurement of education level in surveys

Comparative survey designers generally have the choice between two different types of education questions. The first type is formed by so-called qualification questions. Here most often questions are asked about the highest education level a person has achieved. Such questions are typically (e.g. in ESS and ISSP) phrased in a country-specific format, with commonly used national education classifications being presented to respondents as answer categories on a showcard. Such showcards typically vary widely in number of categories used and sensitivity to historical changes in education systems. The second type consists of so-called duration questions. Here the idea is that the length of an individual's educational career, while abstracting away from the actual level achieved, is functionally equivalent to it and may therefore be used as a proxy. This strategy is also frequently used in comparative surveys, sometime next to qualification questions (e.g. in ESS and ISSP). The questions most often asked in surveys typically are single shot questions that either pertain to the total number of years spent in education or the school-leaving age.

The question type used has important consequences for the data analysis. Qualification questions result in country-specific categorical variables, which, for obvious reasons, are not immediately comparable. If they are to be used in comparative analysis, the categories first need to be made comparable. This is usually done by looking for those elements all country-specific classifications have in common, a process known as common denominator harmonization. This process inevitably leads to a loss of information because some distinctions are relevant in some but not in other countries. As a result, harmonized variables are by definition less informative than their country-specific source variables.

Surveys differ in the way harmonisation is implemented, whereby two main methods may be distinguished: pre- and post-harmonization. Pre-harmonization means that the common-denominator variable is directly implemented in the survey questionnaire. In other words, harmonized answer categories are presented to respondents (at best with country-specific examples) and the underlying country-specific variables are no longer collected. As pre-harmonization means that country-specific distinctions are irretrievably lost, post-harmonization deserves preference. Post-harmonization means that the answer categories presented to respondents are country-specific and harmonized at a later stage. The country-specific source variables may or may not be preserved in the data files, but in general the information remains retrievable.

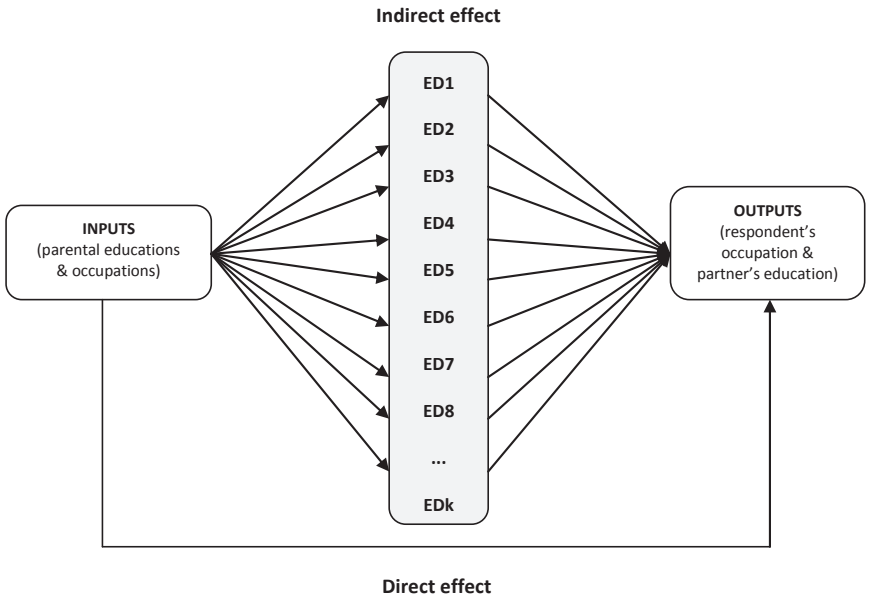
In contrast to qualification questions, duration questions produce continuous variables that are directly comparable, without requiring much further transformation. While this makes duration questions user-friendly, they have their own drawbacks. One major problem concerns their validity, which often has been questioned. Not everybody is convinced that duration is actually a suitable way to measure level of education. Another problem is that duration questions require some arithmetic on the part of the respondent, which inevitably leads to mistakes and as a consequence to enhanced levels of random measurement error. Moreover, an cursory review of question formats used in even one and the same survey reveals a sometimes astounding variation in the exact question formulations as well as in the accompanying specifications of what respondents should and should not include in the count. For surveys such as the International Social Survey Project [ISSP], this casts severe doubts on the comparability of its duration measure. Be this as it may, duration measures are thus far the only continuous education indicator available. Despite their demonstrably low measurement quality, duration measures are therefore functional and useful, and are frequently used by researchers. However, this dissertation will argue that their best use is as a second measure of level of education.

To sum up, both harmonized and duration measures of education have their own weaknesses and, as is demonstrated in this dissertation, may yield variables with rather high levels of measurement error. With some degree of care it is possible to improve both variable types in data collection. This may be done by synchronizing question formats across countries, by avoiding aggregation error or by introducing better harmonisations; all of these been attempted by the European Social Survey (ESS). Such improvements, however, are not always feasible and, moreover tend to cause new problems. Variables may for example end up not being comparable across rounds any more or new improved variables may only be available in later rounds of data collection.

1.3 Two methods to improve the measurement quality of the education variable in the analysis

Two post-hoc methods are proposed here to improve the measurement quality of the education in comparative research. Both methods use the measures that happen to have been collected in a given survey as the starting point and improve measurement quality by complementing or combining conventional methods respectively.

Figure 1.1: Measuring level of education: an optimal scaling procedure



Note: ED1, ED2 etc. are the respective categories within an educational classification

The first method, optimal scaling, serves to improve the measurement quality of qualification variables. The principle of this method is to optimally scale the educational categories contained in a given educational classification, using the intergenerational status attainment model. In this model education level is the mediating variable in an indirect effects model, which contains parental education and occupation levels as input and respondent's occupation and partner's education as output variables. These variables serve as criterion variables, on which the educational categories are scaled. The scaling is considered optimal when the direct effect of inputs on outputs is minimal and the indirect effect running via education is maximal. Figure 1.1 displays the model used for the scaling procedure.

This scaling procedure can in principle be applied to any categorical education variable, whether country-specific or harmonized. Its greatest potential, however, lies in the scaling of detailed and unharmonized (even: unharmonizable) country-specific variables. As country-specific variables tend to contain a great deal more information than their harmonisations, their scaling may produce a variable with increased explanatory power. In this dissertation scale scores are derived for the

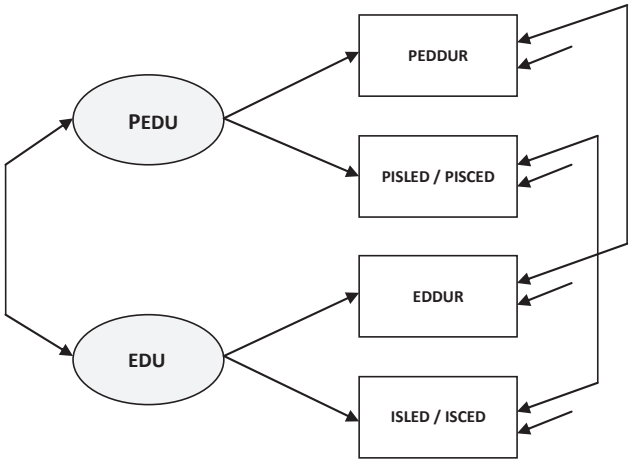
country-specific variables of the ESS (ESS R1-5), yielding a novel comparative variable labelled the International Standard Level of Education (ISLED). When the scaling methodology is applied to harmonized qualification variables, which is also done in this dissertation, the advantage of the resulting variables lies less in its increased explanatory power, but rather in the increased user-friendliness. If the source variable contains a lot of detail, as for example is the cases for the new harmonization introduced in the ESS in round 5 (27 categories), the explanatory power of the scaled variable is the same as that of the underlying categorical variable. The scaled variable is, however, continuous and much easier to use than a categorical variable with such a large number of categories. As the analyses presented here unequivocally demonstrate, moreover, the measurement quality of the scaled variable is much higher than that of the duration measure, which would be the alternative continuous indicator.

In sum, ISLED scale scores then have two important advantages. First, they render categorical qualification variables continuous and if these are country-specific, make them comparable. Second, by exploiting the extra detail contained in the country-specific variables, which gets lost through harmonization, the resulting variables have higher measurement quality. Given that any qualification variable can be scaled, the applicability of the method is in principle very broad. As, however, the improvement in measurement quality is greatest when it is applied to country-specific variables, it is here that the method is at its best.

The second method, latent variable modelling, improves measurement quality by compensating for the weakness of one indicator using the extra information contained in a second, independent indicator. The reason why the combination of two indicators in one measurement model improves measurement quality is mainly that this allows for the correction of the measurement error contained in either of the indicators. Figure 1.2 displays a latent variable measurement model and shows how the education level of a respondent (EDU) is modelled as a latent variable with two indicators: the duration measure EDDUR and either ISLED or a harmonized qualification measure (e.g. ISCED). Due to the correction of random measurement error (indicated by single errors pointing to the measured variables), latent variable modelling by definition maximizes measurement quality.

If, as is the case in Figure 1.2, the model is expanded with a second latent variable (PEDU) for the education level of another person whose education level has been measured with the same indicators (here respondent's partner), it becomes

Figure 1.2. Latent variable model for the measurement of education level of respondent and partner



Note:
EDU = education level respondent; PEDU = education level partner
EDDUR = duration measure respondent; PEDDUR = duration measure partner
ISCED = International Standard Classification of Education respondent
PISCED = International Standard Classification of Education partner
PISLED = International Standard Level of Education partner
ISLED = International Standard Level of Education respondent

possible to also correct for systematic measurement error: this error becomes tractable by repeating the measurement. This error is modelled here with the connected arrows pointing to the respective indicators of the same type, for example EDDUR (duration of education respondent) and PEDDUR (duration of education partner).

It is safe to say that any measure contains some amount of measurement error. Latent variable modelling is the only way to fully correct it. Accordingly, latent variable modelling bears more potential than the improvement of any single indicator, including ISLED. Compared with ISLED, however, latent variable modelling is much more limited in its practical applicability. First, it requires that indeed two independent education measures are collected in one survey, which is not general practice. Second, it requires the use of simultaneous equation modelling, which is not always desirable and not accessible to any analyst. Apart from these practical limitations, however, latent variable modelling is the best method available to improve the measurement quality of the education variable and therefore deserves to be applied as widely as possible.

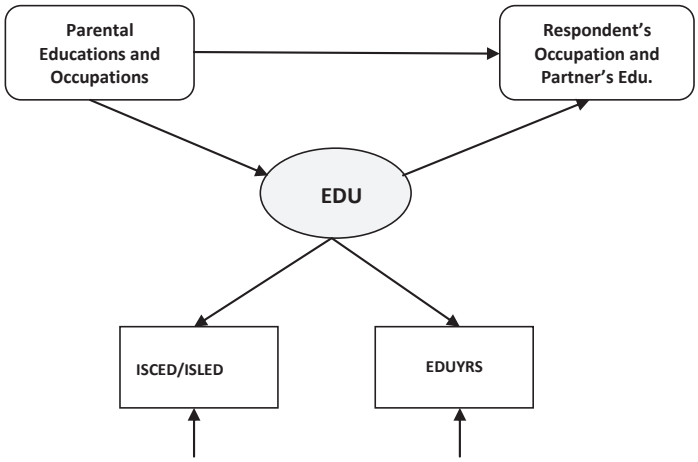
1.4 Underlying theoretical assumptions

Both optimal scaling and latent variable modelling are grounded in substantive as well as methodological theory. To begin with, optimal scaling is embedded in the status attainment model (Blau & Duncan, 1967) and positional good theory (Hirsch, 1976). In order to empirically determine the position of educational qualifications and to derive an ISLED-score for them, we need criterion variables. Suitable criterion variables are variables that are directly and strongly associated with education level. Such variables can be found in the status attainment model (Blau & Duncan, 1967). In this model, the level of education is the mediating variable in an intergenerational status transfer process, in which social inputs, such as parental education and occupation levels, determine social outcomes, such as occupation and education of the partner, via education level. Apart from providing us with suitable criterion variables for the scaling procedure, the status attainment model also generated the theoretically informed definition of education level as the mechanism by which social backgrounds are converted into social outputs. For these reasons the status attainment model is fundamental to this dissertation. It serves both as the model for the optimal scaling procedure as well as for its validation.

Positional good theory (Hirsch, 1976; Thurow, 1975) provides the rationale for the one-dimensional hierarchy that is assumed to be underlying ISLED. The idea here is that in all countries educational qualification can be hierarchically ordered on a single continuum. The position of a given qualification is to some extent determined by the institutionalized structure of the national education system. In other words, there is a nominal or systemic component, which depends on things like programme length, the chronological ordering of successive programmes and formal entry requirements. Instead of relying on such institutional factors to establish the position of a given educational programme in the hierarchy, this position may also be inferred empirically by means of optimal scaling. As positional good theory provides a substantive interpretation for the derived scale scores as an indication of the value of a given educational qualification in society, it is a second theoretical anchor for ISLED.

Methodologically, the optimal scaling procedure is grounded in classic measurement theory (Kelley, 1973), which provides an empirical test for the quality of the education variable. Education is regarded as the mediating variable in an indirect effects (or causal chain) model, where social resources generate social outcomes via education, which functions as a transfer mechanism. The

Figure 1.3: Modelling education levels: a latent variable indirect effects model with level of education as a latent mediating variable, measured with two indicators



Note:
EDU = International Standard Classification of Education respondent
EDUYRS = duration measure of education respondent
ISCED = International Standard Classification of Education respondent
ISLED = International Standard Level of Education respondent

indirect effect model, as displayed in Figure 1.3, explains how the input variables, parental educations and occupations, determine a person's occupation and the education level of their partner both directly and indirectly via education. According to classic measurement theory, the quality of the mediating variable will affect the relative sizes of the direct and indirect effects in this model. The better the measurement quality of the education variable, the smaller the direct effects of inputs on outputs will be, and consequently the larger the indirect effects via education. By the same token, the relative size of the direct and indirect effects may be used to infer the quality of measurement of the education variable. The better the measurement quality of the mediating variable is, the smaller the remaining direct effect will be. Consequently, if education is measured with a single indicator, the quality of that indicator is decisive for the results. When comparing single indicator models, a larger indirect effect denote better measurement. The better the indicator, the smaller the direct effect and the larger the indirect effects, whereby the best results will be achieved if two indicators are combined in a latent variable model, such is in Figure 1.3.

1.5 Chapter overview

The general structure of this dissertation is as follows: two chapters are devoted to the derivation of ISLED and two to its validation. While ESS-data were used for the derivation of ISLED, ISSP-data were used for the validation. The derivation and validation chapters are linked. The country-specific ISLED, which is derived in chapter 2, is validated for the Netherlands in chapter 4. The universal ISLED, which is derived in chapter 3, is validated for all countries it is available for in the ISSP in chapter 5. Table 1.1 provides an overview of all chapters and summarizes what was done, which data and method were used as well as the main results.

Chapter 2

In chapter 2 two methods are introduced and developed to improve the measurement quality of the education variable. The first method, optimal scaling, concentrates on how to better *measure* the level of education.

The second method, latent variable modelling, focuses on how to better *model* level of education. For both methods data were used from rounds 1-4 from the European Social Survey (ESS R1-R4). ISLED is derived by way of optimally scaling all country-specific education categories the ESS in an extended status attainment model. Based on two sociological theories, status attainment and positional goods theory, education level is defined as an intervening variable in an indirect effects model, in which social backgrounds determine social outcomes via education level. Within this model optimal scale scores are generated by minimizing the direct effects of social background on social outcomes, while at the same time maximizing the indirect effects that are mediated by education.

As a result each and every education category found in the country-specific ESS variables receives a score value. The scores are made comparable by calibrating on the duration variable, the alternative indicator of education level that is also contained in the ESS data. After applying an anti-logistic transformation on standardized scale scores, ISLED scores range between 0 and 100 and can be used as a continuous indicator of level of education. Subsequently, ISLED is compared with the two indigenous ESS-measures, the duration measure and the ESS common denominator harmonization, a five-category version of the International Standard Classification of Education [ISCED-97], using the same status attainment model. Alternating the respective education measures as single indicators in the model reveals that ISLED outperforms both ESS standard measures. Next, in order to further improve the measurement quality of the

education variable, the potential of modelling is explored. Instead of using single indicators, now two indicators are combined in latent variable models. This type of modelling further improves measurement quality by means of correcting random measurement error.

Chapter 3

In chapter 3 the ESS data of Round 5 (ESS-R5) are analysed. In this round ESS introduced new, much more detailed education variables. Not only the country-specific variables were adapted and contain more detail, but also the harmonized variables. In particular, a new variable EDULVLb was introduced, which is based on a new version of the International Standard Classification of Education [ISCED] 2011. This new variable contains as many as 27 categories. In practice they are not all used for all countries, but in any case the variable is much more detailed than its predecessor (EDULVLa), which only contained five categories. As EDULVLb is a harmonized variable, its ISLED-scale values are now homogeneous across countries.

Applying optimal scaling to the country-specific as well as to the new and the old ESS harmonisations yields as many as five different ISLED-scaled variables. This makes it possible to isolate the improvement brought about by the scaling procedure from that caused by a difference in detail. Moreover, in ESS-R5 the education variables are available in the same detailed format for multiple persons (respondent, partner, parents), which can be scaled in the same way. This makes it possible to establish the cumulative effect each indicator has on the regression coefficients in the structural model. In line with expectations, the analyses reveal that, generally speaking an increase in detail (number of categories) leads to an improvement in measurement quality. Consequently, the country-specific ISLED performs best again, but now closely followed by the new detailed harmonized variable based on ISCED-2011 and the compact new harmonization EISCED. The old harmonisations turn out to be much weaker. All categorical variables surpass the duration measure in quality. The quality differences are reflected in the regression coefficients within the status attainment model. The better the education indicator used, the smaller the direct effects of parental background on social outcomes, the larger the indirect effect that runs via education and the larger also the explained variance in all dependent variables.

Chapter 4

In chapters 2 and 3 ISLED is tested with the same data and within the same model used to derive it. In chapter 4 ISLED is validated on fresh data, namely

the Dutch data of six rounds of the International Social Survey Programme (ISSP-NL, 2003-2008). These data contain the required variables and also have the advantage of providing two independent education measures not only for the respondent, but also for respondent's partner. For this reason, the data are not only suitable for a validation of ISLED, but make it possible to carry out two additional analyses. First, it is now possible to not only correct for random measurement error, but also for correlated error. Second, by applying a model first introduced by Saris & Andrews (1991), the measurement coefficients that indicate the measurement quality of a given measure, can now be decomposed into a validity and a reliability part.

ISLED-scores are assigned to the ISSP country-specific variables based on the universal ISLED based on ISCED-2011 as developed in Chapter 3. The newly derived variable is compared with the indigenous ISSP measures, a harmonized qualification measure and a duration measure. The results are clearly in favour of ISLED, which scores best on all accounts. It contains the lowest amount of random and no correlated measurement error and consequently has the highest validity as well as reliability. Our analyses furthermore reveal that the ISSP harmonization performs remarkably well, while the duration measure turns out to be of much lower quality.

Chapter 5

While in chapter 4 ISLED was validated on fresh data, the validation was restricted to one country, the Netherlands. In chapter 5 ISLED is once more submitted to the test, but this time using data from the ISSP Social Inequality IV module from 2009 (ISSP Research Group), for all European countries that participated. In order to have a benchmark to evaluate ISLED against, first the country-specific ISSP education variable was optimally scaled, using first and current occupation, as well as parental occupations as criterion variables. Moreover, the universal ISLED-scores based on ISCED-2011 were applied to the country-specific ISSP variables. Subsequently, ISLED is compared with the same indigenous ISSP education measures as in chapter 4, as well as the optimized ISSP-variable. As this latter variable was derived on the same data, it is not surprising that it yields the best results. However, it is closely followed by ISLED, which not only proves to be perfectly adequate to use on fresh data, but outperforms the two indigenous ISSP education indicators for all European countries. It must be admitted that the difference between ISLED and the ISSP-harmonization DEGREE is very slight and only shows up in the third decimal. The difference between ISLED and its continuous rival, however, is substantial.

Table 1.1: Summary of chapters

	Goal	Data	Method	Results
Chapter 2	Introduction of two methods to improve measurement quality of education variable: -optimal scaling -latent variable modelling	-ESS R1-4 (2002-2008) -35 European countries -Sample: 25-74, no students -N=150,567 -*Education variables*: EDLVXX, EDULVLa, EDUYRS -*Criterion variables:* Input: Father's and mother's education and occupation Output: Respondent's occupation, partner's education	-optimal scaling of country-specific ISLED-scores -latent variable modelling -comparing different single indicator and latent variable models	-country-specific ISLED scores for 35 countries (online appendix) -ISLED improves measurement quality and yields better results than indigenous ESS education indicators -latent variable modelling optimizes measurement quality and yields best possible results
Chapter 3	Comparison of ESS education measures	-ESS R5 (2010) -25 European countries -Sample: 18-74, no students -N=41,264 -*Education variables*: EDLVa/b/c/dXX, EDULVLb, EDULVL, EDULVLa, EISCED, EDUYRS -*Criterion variables:* Input: Father's and mother's education and occupation Output: Respondent's occupation, partner's education	-ISLED scores are developed for 5 harmonized variables as well as for country-specific variables of R5 -comparing different single indicator and latent variable models	-country-specific ISLED for new more detailed country-specific ESS education variables -universal ISLED scores based on new detailed harmonized education variable based on ISCED-2011 are presented, which can be used for any survey or country -ISLED scores for remaining old as well as new ESS harmonisations
Chapter 4	-Validation of ISLED on Dutch ISSP data -correction for systematic measurement error -distinction validation and reliability	- ISSP-NL 2003-2008 -Sample: 25-74, no students -N=5,732 -*Education variables:* DEGREE, EDUCYRS -*Criterion variables:* Input: Father's and mother's education and occupation Output: Respondent's occupation, partner's education	-applying Dutch ESS-derived country-specific ISLED scores to Dutch ISSP country-specific variable -MTMM-model -correction for systematic measurement error -comparison of 3 single-indicator models and latent variable model -comparing different single indicator and latent variable models	-ISLED can be used with these data without any problem -ISLED produces best results: *highest reliability and validity *lowest amount of random measurement error *no systematic error (duration measure does) -ISSP-harmonization is second best -Duration measure is poorest measure by all standards
Chapter 5	-Validation of ISLED on cross-national ISSP data	-ISSP, Social Inequality IV module (2009) -Sample: 25-74, no students, European countries only -N=25,999 -*Education variables:* DEGREE, EDUCYRS -Criterion variables: Input: Father's and mother's occupation Output: first and current occupation respondent	- applying ISLED coding to ISSP country-specific variables, based on ISCED-2011 -comparing different single indicator and latent variable models	- ISLED can be applied to international ISSP data without any problem -ISLED is on average best indicator -ISSP-harmonization is second best -Duration measure is poorest measure by all standards

In a further step we compare the effect of the measurement quality of the education variable on the coefficients in the structural model. Contrasting the worst (duration as single indicator) with the very best model (double indicators) reveals that the difference in explained variance in the three dependent variables may be considerable, ranging from 3.5% in current occupation, via 5% in education to as much as 9% in first occupation.

1.6 Results

The most important contribution of this dissertation is, no doubt, the construction of a novel comparative education measure, the International Standard Level of Education (ISLED). ISLED is a theoretically grounded and empirically derived measure and is presented in two editions, one country-specific and one universal, which are derived from different source variables. ISLED is based on a clear theoretical conceptualization of education level as transferring social status from one generation to the next. In particular, education is defined as the mechanism by which parental educations and occupations determine an individual's occupational status and likelihood to attract a high educated partner. Like duration measures, ISLED is a continuous measure, which is easy to use in statistical analyses. Compared with conventional measures, be it qualification or duration measures, in all the analyses presented here the country-specific ISLED excels as the education measure with the highest measurement quality. In other words, the country-specific ISLED is found to contain the lowest amount of random and correlated measurement error and for the data at hand turns out to be the variable with the highest validity and reliability.

The introduction by ESS in round 5 of a new very detailed harmonized education variable based on ISCED-2011, EDULVLb, made it possible to derive a universal edition of ISLED, which bears even greater potential than the country-specific one. The advantage of this universal ISLED is that it is homogeneous for all countries (the scale scores per level are the same for all countries) and that it can easily be applied to other data. Especially, once country-mappings will become available for ISCED-2011, ISLED-scores can in principle be assigned to just any national education classification in any survey. This makes ISLED the truly international measure of education level it was originally conceived of. The validation study presented here in chapter 4 suggests that this universal ISLED cannot only be a new standard and user-friendly measure of education level, but also that it may also substantially improve results, especially compared with its frequently used continuous competitor, the duration measure. The measurement quality of the

universal ISLED is, moreover, only marginally weaker than that of the country-specific edition.

Apart from ISLED, this dissertation introduces a second method to improve the measurement quality of the education variable: latent variable modelling (Bollen, 1989). This method, which is common practice for the measurement of social attitude variables, is here applied to the measurement of a social background variable, level of education. The method combines two independent education indicators, which makes it possible to correct random measurement error, maximizing the ultimate measurement quality of the education variable. As error correction is not possible with a single indicator, latent variable modelling is a valuable complement to ISLED and sets the standard against which ISLED and other measures must be judged. If, moreover, two independent variables are available for another person, for example the partner, it is possible to not only correct random but also correlated error. Only such full error correction yields truly unbiased regression coefficients in structural models.

The accumulated empirical evidence of all the analyses is summarized in Table 1.2. As the analyses consist of two derivation and two validation studies, it contains two sets of analyses for each of the two datasets used (ESS and ISSP). This yields four sets of measurement coefficients for ISLED as well as measurement coefficients for the respective indigenous education measures it is compared to. Table 1.2 unequivocally singles out the country-specific ISLED as the variable with the highest measurement coefficient, oscillating around 0.95, closely followed by the universal ISLED and EISCED. The table also shows that the measurement coefficients for both editions of ISLED are remarkably homogeneous across surveys. As for the harmonized measures, the ESS-R5 data show that the quality of the measure depends on the amount of detail (the number of distinguished categories) that is retained in the harmonized variable. This effect, however, is not linear. As a comparison between EDULVL and EISCED (both contain seven categories) illustrates, a comparatively small number of additional categories can produce very different results. Apart from the number of categories, the measurement quality of a harmonized variable also turns out to crucially depend on the way national categories are aggregated into the broader categories of the respective harmonized variable. In all analyses it is the duration measure that comes out as the weakest measure. For all education variables compared, it holds that the measurement quality differs across countries. Here too, however, ISLED excels as the most stable variable in the sense that the distribution of the measurement coefficients has the lowest level of dispersion in all the cross-national analyses.

Table 1.2: Measurement coefficients across chapters

	Nr. of cat.	Chapter 2 ESS R 1-4 (2002-2008)	Chapter 3 ESS R 5 (2010)	Chapter 4 ISSP-NL (2003-2008)	Chapter 5 ISSP (2009)
Education variable		**Measurement coefficients (factor loadings)**			
ISLED (country-specific)	**variable**	**0.949**	**0.960**	**0.952**	
ISLED (universal)	**27**		**0.953**		**0.941**
Duration	n.a.	0.859	0.866	0.782	0.857
Old ESS harmonization	7	0.892	0.907		
New ESS-harmonization	7		0.947		
New ESS-harmonization	5		0.902		
ISSP harmonization	8			0.931	0.936
N		150,567	41,264	5,732	25,999

NB: For ISLED the number of categories concerns the source variables. For the country-specific variables it varies per country. For the universal ISLED, the source variable is EDULVLb with 27 categories.

In chapter 4, which is confined to Dutch data, it was possible to correct for correlated systematic error. The results once again favour the country-specific ISLED, which, in contrast to the ISSP duration measure, turns out to be free of correlated error. For the Dutch ISSP-data it was, furthermore, possible to empirically dissect measurement quality into a validity and a reliability part, a type of modelling introduced by Saris & Andrews (1991), which was here for the first time applied to the measurement of a background variable. The country-specific ISLED stands out once again as the measure with both the highest reliability and highest validity.

Finally, the analyses presented in chapter 3 may prove to be of additional value as a reference for researchers who set out to analyze ESS education data. Given the wide use of ESS data, this is an important contribution in its own right. The chapter contains descriptions of both the new and the old ESS education variables, including changes between rounds. While it is possible to retrieve this information from the ESS website, the information there is scattered across different files, making it hard for users to put all the puzzle pieces together. This dissertation chapter provides a concise overview of all ESS education variables and, more importantly, a systematic assessment of their respective measurement quality. The analyses warrant the conclusion that the revision of the ESS education variables was highly successful. Both the country-specific source variables and the two new harmonisations are shown to be a major improvement over their predecessors. While it is predictable that the 27-category variable has better measurement quality, the high quality of the seven-category harmonization variable EISCED, is remarkable.

1.7 Contentious issues

The research presented here is based on certain assumptions. While there are good reasons for them, I acknowledge that some of the choices made may be questioned. A first contentious issue is the theoretical basis of ISLED. In principle ISLED is the outcome of empirically driven research. As stated above, the analyses are informed by sociological theory, but the choice of theories is not the only one possible. Positional good theory, for example, assumes that there is a single hierarchy of job seekers. But is this assumption justified? One could for example argue that, rather than one, there are several job queues and that job queues do not only depend on the education level, but also on the educational field and the labour market segment. This could imply that job seekers are only in the same queue as long as they are in the same field and aim for jobs in the same labour market segment, in other words that doctors do not compete for jobs with lawyers. In defense of the choices made here, I would argue that even if this were the case, the hierarchy of the most relevant outcome of the status attainment process, income, is unquestionably one-dimensional.

A second point of criticism concerns the empirical findings. It might for example be argued that ISLED scale scores can vary between men and women, and that different scale scores are needed for these two groups. Given, however, that men and women operate in the same labour market, a conscious choice was made not to go along this road. Differences between groups as well as changes over time are difficult to assess if the measure changes as well. For this very reason, it was the explicit aim of this dissertation to produce one standard measure of education that can be applied in different contexts and which can be used to assess the differential effects or determinants of education level for any group or time period.

A third controversial issue concerns the scaling methodology used. To begin with, the choice of criterion variables may be questioned. Other choices would have been possible. One alternative would have been to, like with the International Socio-economic Index of Occupation (ISEI) (Ganzeboom, de Graaf & Treiman, 1992), use single input and output variables instead of several. By the same token, different types of criterion variables could have been chosen. For example ISLED could have been derived using only the occupations of the parents as input variables, rather than their educations and occupations combined. Similarly, different outcome variables are feasible, such as for example income. The variables used now for the derivation of ISLED are all

directly associated with education and include the two variables most strongly correlated with education level, father's and partner's level of education. In other words, the criterion variables used do pick up the largest part of the variance in the education variable. Furthermore, this approach integrates the approaches used in previous scaling attempts, in which either a single income as in cause-proportional scaling (Smith & Garnier, 1987) or a single outcome as in effect-proportional scaling (Treiman & Terrell, 1975) were used as criterion variables. By integrating the two into a cause-and effect-proportional scaling, the impact of any single criterion variable on the scale scores could be drastically reduced, countering an important criticism of previous scaling approaches.

A fourth matter of concern is the algorithm used for the derivation of ISLED, which is rather coarse. Input and output variables are used unweighed, with no attention being paid to their different level of association with education. The algorithm used, however, has the advantage of being simple and functional. As a more refined algorithm would likely have a negligible effect on the results, a conscious choice was made in favour of parsimony.

A fifth issue of debate is using of the duration measure to make ISLED scale scores comparable. Here too, alternative options would have been possible (and have been explored). One alternative option would have been the use of common anchor points (e.g. end of primary and secondary school). Anchor points, however, rely on the same common denominator principle as harmonization and consequently pose the same problems. Anchor points would need to be reconciled across a large number of countries, when there are no hard and fast criteria to decide which programmes are of the same level. In order to avoid this problem, preference was given to the use of the duration measure, which like the within-country ISLED scale scores, has an empirical basis. The ESS duration measure, moreover, has been asked in the exact same format in all countries and rounds, producing a highly consistent and comparable variable.

A sixth and final matter of contention concerns the circularity induced by the validation model, in particular the test studies reported in chapter 2 and 3, in which ISLED is compared to other ESS education measures. Here, not only the validation model is exactly the same as that used for the derivation of ISLED, but also the same data are used; it may be argued that it is an artifact of the derivation process if ISLED performs better than the other measures. This criticism is addressed by including the two validation studies that both use different data, the ISSP, and at least one of which in part uses some different variables in the status attainment model.

To sum up, the methodology used for the derivation of ISLED, while being vulnerable to criticisms on a number of points, is the result of a lengthy and thorough process of thought, including many empirical analyses to explore alternative options. It was informed by the state of the art in scaling, continuously revised and adapted and is the best possible choice within the limitations of this study. The theoretical and methodological grounding of ISLED as well as the consistently high measurement quality of the measure evidence the level of care that was used to make it.

1.8 Limitations and suggestions for further research

Despite its merits, it must be acknowledged that the research presented here has a number of limitations. One set of limitations concerns the derivation of ISLED, another its validation. As for the derivation of ISLED, a first important limitation is the number of countries ISLED is available for. Since we used ESS-data to derive it, ISLED is so far confined to European countries. The applicability of ISLED in non-European contexts, however, is within reach. All that is needed is OECD to provide country-mappings for ISCED-2011. It is a matter of time that this will be achieved and that (the universal) ISLED can be applied in a non-European context.

A second limitation concerns the quality of the source variables used to derive the country-specific edition of ISLED. With the benefit of hindsight, it might have been preferable to base the country-specific ISLED on the new, more detailed country-specific variables that were introduced in round 5. This was in fact done in the analyses of chapter 3, but the estimates are based on much smaller samples because for the time being only ESS round 5 data contain these new variables. Future work could redo the analyses combining data of several rounds. However, the results of chapter 3 indicate that an ISLED developed on more detailed source variables would yields only marginally better results (cf. Table 1.1).

A third limitation concerns the two editions of ISLED. Again with the benefit of hindsight, it may have been preferable to focus on the development of universal ISLED scores from the start. Given that the advantage of a country-specific ISLED over the universal ISLED is rather slight for the ESS round 5 data and that the universal ISLED actually produces better results than the country-specific variable derived for rounds 1-4 (cf. Table 1.1) and that, moreover, an application of the universal ISLED-scores to fresh data is much more straightforward, such

a design might have been sufficient to meet the goal of this dissertation. As the appropriate data became available much too late to revise the project, however, this option was not actually feasible. As a result, this dissertation presents two editions of ISLED, which may cause some confusion.

A fourth set of limitations concerns the validation of ISLED. ISLED, it must be acknowledged, still needs much more testing. First, it has so far only been validated with ESS and ISSP-data. Given that ESS-data were also used to derive ISLED, these analyses cannot, as stated above, avoid an element of circularity and critics may say that ISLED's superiority is merely an artifact of the derivation process. The only independent data-set used for validation is consequently the ISSP. While the ISSP results are encouraging, ISLED must still be tested with different data, such as for example the European Value Survey (EVS). Second, thus far ISLED has only been tested within the status attainment model. While, on a positive note, one of the validation studies at least used some different criterion variables within the status attainment model, more analyses need to be done. Such variables must be strongly associated with education level. Even within stratification theory, the pool of possible criterion variables is not exhausted. An obvious alternative outcome variable would for example be income. Alternative validation criteria outside of status attainment theory could be cultural participation or health. While I am confident that it will, future research still needs to prove that ISLED passes these tests as well.

A fifth and final limitation relates to the duration measure. In the latent variable model two independent education measures have to be available. One of these measures is the duration measure. This measure is needed to make it possible to assess the measurement quality of the first indicator. For latent variable modelling the quality of this second indicator is rather inconsequential. In principle, however, given that duration is probably the most frequently used indicator of level of education, its measurement quality is important in its own right. While the ESS duration measure is based on a single question format that remained stable across rounds, this is not always the case. The exact question formulations of duration questions vary considerably across and even within surveys (cf. ISSP). It may therefore be worth investigating which type of question format actually works best. In other words: whether a question on the length of the educational career yields different results than a question on the school-leaving age. In view of the low measurement quality of the duration variables in all the analysis presented here, such research may ultimately lead to an improvement of the measurement quality of duration measures.

1.9 Recommendations

The results of the analyses presented here have repercussions for both data collection and data analysis. To begin with data collection, the systematic comparison of the various different education measures contained in the ESS and the ISSP has revealed that they differ in a predictable way. As for qualification variables, it generally holds that their quality improves with the amount of detail they contain and that any loss of detail, i.e. any loss in the number of distinguished categories, attenuates regression coefficients in structural models. A first recommendation is therefore that country-specific source questions asked in questionnaires should be as detailed as possible and that these country specific variables should be made accessible for users.

Duration measures, by comparison, while having the advantage of being more straightforward in use, turn out to be more error-loaded than any of the qualification measures and consequently need to be used with some caution. Despite the relatively poor measurement quality of duration measures, they are extremely valuable as the second indicators needed for latent variable modelling. A second recommendation for data collectors is therefore that all comparative surveys should include these two independent questions on education. Ideally this information should be collected not only for the respondent, but also for other persons. Only if this is the case, both random and correlated measurement error can be corrected and accurate regression coefficients obtained.

As far as data analysis is concerned, two methods are proposed to improve measurement quality in the education variable. Both these methods have been shown to improve the results achieved using any of the conventional indigenous measures found in the surveys. To begin with, two editions of ISLED are presented, both of which are user-friendly continuous indicators of education level, which have the potential to considerably improve results. One ISLED is country-specific, the other one universal and both have their own applications. The country-specific ISLED is particularly suited for the analysis of ESS-R1-4 data, where it has been shown to be the best single indicator. While it is in principle possible to apply it to other data as well, here, due to its grounding in ISCED-2011, it is the universal ISLED that deserves preference. In the future especially, once ISCED country-mappings have been renewed, ISLED should be very straightforward to apply. As long as these mappings are still lacking, its applicability may be more awkward and require some background knowledge. In a European context, however, application should be straightforward. A third recommendation is

therefore that given ISLED has the potential to improve results, in a European context at least, it may and should be used.

The merits of ISLED notwithstanding, we have achieved the very best results by means of latent variable modelling. Correction for random (and if possible correlated) error proves to outperform any single indicator, including ISLED. A fourth and last recommendation is therefore that latent variable modelling is applied wherever feasible.

Chapter 2

Measuring and Modelling Level of Education in European Societies

Chapter 2 [3]

Measuring and Modelling Level of Education in European Societies

We present two methods to improve the comparative measurement of level of education. The first method derives optimal scale scores for the country-specific education categories distinguished in the European Social Survey Round 1-4 [ESS R1-R4]. This results in a novel continuous comparative education measure that we label ISLED: the International Standard Level of Education. The second method further improves measurement quality by modelling level of education as a true-score latent variable that is reflected in two observed indicators. In particular, we combine ISLED and a common-denominator harmonization based on the International Standard Classification of Education [ISCED], respectively, with an independently collected duration measure. Embedded in an extended intergenerational status attainment model, this allows us to compare the measurement quality of ISLED with that of two often used comparative education measures: duration and ESS's five-category harmonized qualification indicator. ISLED outperforms both by some margin, but still attenuates measurement by 5%. Full disattenuation can, however, be achieved by means of latent variable modelling as this brings about correction of all (random) measurement error.

2.1 Introduction

In this article we examine ways to improve the measuring and modelling of level[4] of education in international comparisons. Being a core variable in many empirical problems and the pivotal dimension of stratification in modern societies, research should treat the measurement of education level with ultimate care. Yet, an examination of existing cross-national surveys reveals an astonishing lack of comparability. Surveys use a large variety of classifications

3 This chapter is co-authored by Harry Ganzeboom and has been accepted for publication in the European Sociological Review (Schröder & Ganzeboom, 2014). Earlier versions were presented at the ESRA Conference in Warsaw 2009, at the University of Amsterdam in 2009, at the IAB in Nuremberg (Germany) in 2010, at the RC28 Conference in Haifa (Israel) in 2010 and at the ECSR Conference in Paris (France) in 2010.

4 Education levels here are defined as distinct categories. While the term level may be understood to refer to having a beginning and an end, we refer to a level here solely in terms of completion. Educational attainment would therefore be defined as the completion of an education programme of a given level and education level is regarded and used here as a functional equivalent of educational attainment.

with differing numbers of education categories. Cross-national comparability is obtained (in pre- or post-harmonization) by calling upon a usually overly crude common denominator approach or by using a duration measure, both of which, as we will show below, underestimate the role of education considerably.

We present two methods for the cross-national comparative measurement of education level that allow us to preserve and effectively employ all the available information in existing education data – even if variations in measurement occur within a country –, as well as to estimate models that tap effects of the true level of education with correction for any (random) measurement error. Both methods are applied to data of the European Social Survey (ESS R1-4).

With the first method we develop by means of optimal scaling a novel continuous comparative measure of level of education, the International Standard Level of Education [ISLED]. This measure quantifies the relative value of individual country-specific education categories in the ESS. The development of ISLED is grounded in two sociological theories, the status attainment model (Blau & Duncan, 1967) and positional good theory (Hirsch, 1976), and further supported methodologically by classic measurement theory (Kelley, 1973). These theories lead us to conceive of level of education as a single intervening variable in an indirect effects model, in which social background produces social outcomes via education. Optimal scale scores are derived within this model by maximizing the indirect effect of social background on social outcomes via education, and minimizing the direct effect.

With the second method, we analyze level of education as a true-score latent variable in the same indirect effects model, but now combining ISLED, as well as an often used five-category international harmonization, with a duration measure, in a latent variable model. This allows us to assess and compare the measurement quality of all three comparative indicators of education level in the ESS and shows ISLED to outperform both its competitors by a wide margin (11-14%). Despite its high quality ISLED still causes an attenuation of 5%. Unattenuated measurement can, however, be achieved in the latent variable model as this brings about the correction of all (random) measurement error.

2.2 The comparative measurement of education level: state of the art

There are several related reasons for the rather unsatisfactory state of the art in the comparative measurement of education level. The main reason is probably

the complexity of the task at hand. After all, what needs to be accommodated is a staggering diversity of education systems, which do not only vary across countries but also over time. Due to the crucial role of education in modern society, countries keep reforming their education systems, forever increasing or decreasing the number of different school types and programmes, abolishing some and adding others. Unlike with occupations, educational differentiation is primarily driven by path-dependent institutional developments that make national education systems highly idiosyncratic (Allmendinger, 1989; Shavit & Müller, 1998). Comparative measurement in cross-national designs and also in a historical perspective, to some extent always means comparing the incomparable.

While the diversity in education is undoubtedly the heart of the problem, it is only part of the story. Many attempts have been made to implement standardized comparative measures, mostly based on common denominator harmonization (discussed below). Unfortunately, different projects have opted for different standards and even where the same standard classifications are used, they have been implemented in different ways. Whatever measure is chosen, it has consequences in terms of attenuation. These consequences vary between measures and differ in severity but need to be addressed if we want to obtain unbiased statistical results. In our view the comparability problem can best be understood as a measurement problem and solutions be drawn from classic measurement theory. In his article on causal modelling Bentler (1980) conceptualizes measurement as a common factor model, in which a latent true score is reflected in multiple observed indicators, with differing measurement quality. The quality of indicators can be estimated and is expressed in their respective measurement coefficients (factor loadings). If we want to produce better measurement quality and hence improve upon the state of the art, we first need to specify what the methodological principles are behind the various comparative measures and which consequences they each have for empirical outcomes. We discuss three such principles as found in the literature: common denominator harmonization, duration and scaling.

Common denominator harmonization

The probably most frequently used method of measuring education level in cross-national surveys is harmonization by largest common denominator. The idea here is that different education systems can be made comparable by looking for equivalent elements. The difficulties with this approach are

easily anticipated. First, such a strategy leads to loss of information as any common denominator by definition contains fewer categories than the source classifications to be harmonized. Second, for some categories it is simply not possible to find a common denominator and incomparabilities can at best be solved by compromise. Third, these difficulties increase with the number of source classifications to be harmonized. After all, the largest common denominator of 10 different classifications is cruder than that of three and the likelihood of finding unharmonizable elements increases accordingly.

A widely used common denominator is the International Standard Classification of Education [ISCED], developed and maintained by UNESCO. ISCED [5] is a very detailed and comprehensive taxonomy that is meant to provide an "integrated and consistent statistical framework for the collection and reporting of internationally comparable education statistics" (ISCED, 1997:14). In practice, however, the way ISCED tends to be implemented in comparative surveys produces a coarse educational distribution, rather than a detailed classification. Schneider (2009, 2010) and Schneider & Kogan (2008), among others, have evaluated the quality of ISCED-97 (OECD, 1999) and the way it is applied in the ESS and list a large number of problems. One general problem they find is that the ISCED-97 main categories contain insufficient differentiation. In particular, there is no distinction between vocational and academic programmes in secondary and tertiary education, which is for example relevant for the German and many other European education systems (Schneider & Kogan, 2008). Moreover, for many countries coding into ISCED-97 is not consistent across different rounds of ESS (Schneider, 2009: 101-133).

When assessing approaches to common denominator harmonization, it is useful to distinguish between pre- and post-harmonization. Pre-harmonization means that a standard classification such as ISCED is directly applied in the question format in the survey. This strategy is undesirable, as any reference to the underlying original local categories is lost forever and this information loss is beyond repair. In the ESS, this is for example the case for the United Kingdom in the first rounds. In post-harmonization, surveys ask for locally relevant categories, which are subsequently recoded (aggregated) into the common denominator. In principle, post-harmonization is equally damaging in terms of information loss, but since the local source categories remain accessible the lost information can

5 ISCED was first launched by UNESCO in 1976 for a limited number of OECD countries and then revised in 1997. Our discussion refers to ISCED-97. Recently, a revision has been launched, ISCED-2011.

be restored, making it possible to detect coding errors or to exploit the extra detail of the local categories for analytical purposes. For these reasons asking country-specific categories in a questionnaire and post-harmonizing them deserves preference. This has been the practice for most, but not all countries in the ESS.

The mere availability of country-specific categories, however, in no way guarantees that this information is actually used. In fact, users of surveys like ESS, seemingly intimidated by the great variety of distinctions and labels they are confronted with, tend to ignore them and confine themselves to the familiar common denominator variables. Schneider (2009), who illustrates how much can be gained in terms of explanatory power if country-specific categories are coded into CASMIN (Comparative Analysis of Social Mobility in Industrial Nations) or ES-ISCED, two alternative common denominator harmonisations, is a notable exception.

Duration

A simple alternative method to compare education across countries is to ask respondents about the duration of their educational career, effectively assuming that duration increases with the level achieved. The questions posed refer to either the school-leaving age or the number of years spent in education. Using duration as a comparative indicator of education level is straightforward, but has some drawbacks. Hout & DiPrete (2006) argue that duration works reasonably well for horizontally undifferentiated ('comprehensive') education systems, such as in the United States, but is much less suited to capture the distinctions of the tracked education systems found elsewhere. In the European context, Schneider (2009: 29) and Müller (2008) question the validity of the duration measure. Given the identical length of very different types of educational programmes within and across countries, they argue that confining measurement to duration amounts to concealing qualitative differences between them. Schneider (2009: 452-454) also shows (and we will confirm this below) that the measurement quality of duration measures is lower than that of the detailed categorical measures.

Using a duration measure, however, also has some important advantages. First, it exploits a feature that is intrinsically present in the organization of any education system, namely that it takes time to pass to higher levels: you cannot start your career at more advanced levels. Second, taken over the entire distribution,

duration is strongly correlated with any other indicator of level of education and can therefore be interpreted as an independent measurement method. Third, duration has a meaningful analytical interpretation, as it is directly related to human capital accounts of education: irrespective of what is being learned, duration captures how long students forgo current earnings to invest in future earning capacities. Fourth, and very importantly, duration has a metric that is directly comparable across systems with no further transformation needed. Duration questions are particularly simple to ask in comparative surveys, a point that is dramatically confirmed by the treatment of education variables in the ESS: while many changes have occurred in the country-specific measures and common-denominator harmonisations (partly because with hindsight these turned out to be error-ridden), the ESS duration measure has stayed the same in all rounds and countries. For this reason we consider the availability of the duration measure in the ESS as very valuable and exploit it as a calibration variable to derive a comparative metric for ISLED.

Scaling

A third strategy to make education categories comparable is via common scaling. We can distinguish between ad-hoc and empirical scaling methods. One widespread ad-hoc scaling method is to base the scaling on the number of years it takes to achieve a given level according to the institutionalized education system. This is conceptually similar to, but in practice rather different from using a independent duration measure. Appropriate institutional duration measures are provided in the *Education at a Glance* publications of OECD (2011) as well as in the manual on the implementation of ISCED-97 (OECD, 1999). In the International Stratification and Mobility File (Ganzeboom & Treiman, 2012), for example, a variable is provided that expresses local categories in 'pseudo-years' of education. A related approach is proposed by Hoffmeyer-Zlotnik & Warner (2007), who organize education categories in four countries into 10 different levels that can be regarded as an ordinal hierarchy. Like scaling by 'pseudo-years', this approach is ad-hoc and non-empirical.

An example of an empirically based scaling method is so-called *effect-proportional scaling*, where scale scores are generated by maximizing the correlation between given education categories and an output criterion variable (e.g. occupation or income). In their early comparison of the US and British status attainment regimes, Treiman & Terrell (1975), for example, derive comparative education scores, using an output variable (respondent's occupation) as a criterion. They

motivate this choice with the argument that it is a primary function of the education system to prepare individuals for employment and that the correlation between education and occupation is particularly strong. By contrast, Smith & Garnier (1987) generate an education scale using an input (father's occupation) as criterion variable. Like respondent's occupation, father's occupation too is strongly associated with education level. Consistent with the term effect-proportional scaling used with output criterion variables, we suggest to label scaling with input criterion variables as cause-proportional. No matter how it is done, empirical scaling has the potential of using all available information.

Scaling has not, however, remained without criticism either. Braun & Müller (1997) for example contend that in effect-proportional scaling we have to assume that the explanatory power of the respective country-specific measurements is comparable. Also, the criterion variable would have to be measured in a strictly comparable metric, which transfers the problem of deriving a comparable education metric to the criterion variable. We question the validity of this argument because even if the criterion variables are poorly measured, this does not necessarily affect the ordering of the education levels nor the relative distances between them. Braun & Müller (1997) confuse pattern and strength of association.

2.3 Measuring and modelling level of education in an indirect effects model

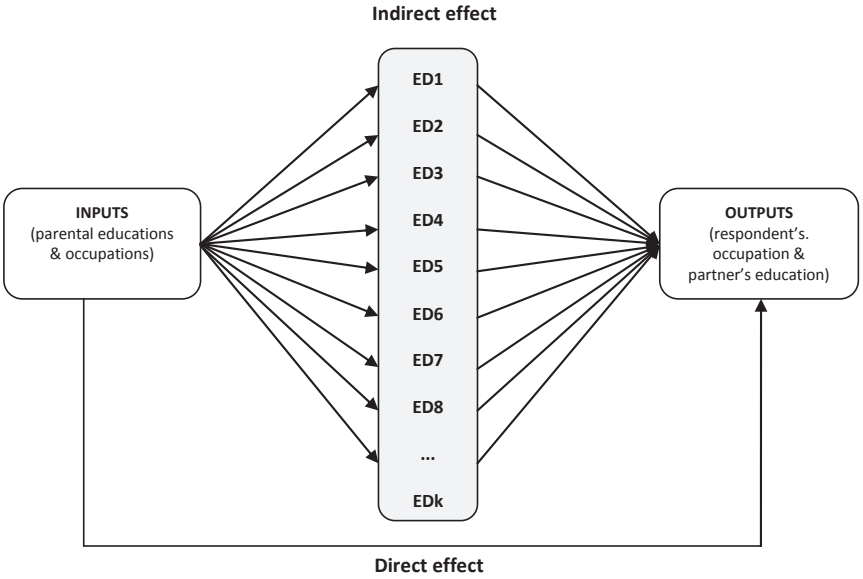
Our approach to the comparative measurement of level of education consists of two separate methods. With the first method we measure the value of the education categories contained in the country-specific variables by means of optimal scaling. With the second method we model level of education in a double-indicator latent variable model.

Method 1: Measuring level of education via an optimal scaling procedure: ISLED

The basic model for our optimal scaling procedure is shown in Figure 2.1. Here, discrete (national) education categories are interpreted as intervening between inputs and outputs in the stratification process.

The input variables tap parental resources that condition offspring's attained education level. Education level for its part affects multiple output variables. Education is thus understood as the mechanism converting social resources into

Figure 2.1: Measuring level of education: an optimal scaling procedure



Note: ED1, ED2 etc. are the respective categories within a national classification of education

social outcomes, whereby the value of educational qualifications is on the one hand revealed by the rewards they yield in the labour and marriage markets and on the other hand by the appeal they have for the social status groups competing for them. We merge these two different but related aspects and optimally scale education categories such that the indirect effects of inputs on outputs via education are maximized and the direct effects are minimized. In other words, education level is operationally defined as the scaling of education that best accounts for the conversion of social resources into social outcomes. In our scaling procedure we follow up on previous scaling approaches, but improve upon them in two ways. First, we integrate cause- and effect-proportional approaches in one unified model. Rather than choosing between either input (Smith & Garnier, 1987) or output variables (Treiman & Terrell, 1975), we combine the two. Our approach is therefore labelled *cause-and-effect-proportional scaling*. Second, instead of confining ourselves to single criterion variables, we use several inputs and several outputs. This makes that the scaling is not crucially dependent upon specific patterns of educational attainment, occupational achievement or homogamy. Finally, we solve the comparative metric problem independently by using duration as a calibration measure.

Method 2: Modelling level of education in a latent variable model

With the second method we again analyse the role of education as intervening variable in the status attainment process, but now model education as a latent variable with two indicators. Provided that the indicators are collected independently, the latent variable model makes it possible to identify the unique true-score information as well as to estimate and correct the measurement error in each indicator. Latent variable modelling can lead to further improvement of the measurement quality of the education variable, over and above optimal scaling and can also be applied independently.

2.4 Theoretical backgrounds

Our procedures find theoretical support in two substantive theories on the role of education in society: the status attainment model (Blau & Duncan, 1967) and positional good theory (Hirsch, 1976). Methodological support is provided by classic measurement theory.

The status attainment model

A first theoretical anchor for our scaling procedure is provided by the intergenerational status attainment model (Blau & Duncan, 1967). The model shows education to be the pivotal mechanism in intergenerational status transfer. This not only provides a clear conceptualization of the role of education in society, but also a theoretical rationale for our choice of criterion variables. On the output side of the model we adopt both respondent's occupational status and partner's education level as criteria. While occupational status is the only output variable in the classic model, status attainment research has solidly shown that around the world the education level of an individual is also strongly associated with that of their partner (e.g. Smits et al., 1998). For this reason we have included partner's education level in our model as well. On the input side we work with the combined effects of father's and mother's education levels and occupational statuses. We use information on both parents because there is ample evidence that both fathers' and mothers' educations and occupations strongly affect a person's educational attainment (e.g. Korupp, 2002).

Positional good theory

A second theoretical anchor for our scaling procedure is derived from positional good theory (Hirsch, 1976; Ultee, 1980). While material goods can in principle

be produced in unlimited quantities, positional goods are of fixed supply. Educational qualification may be classified as positional goods and should be interpreted as relative positions. Positional good theory argues that education systems at all times and places, regardless of all their institutional differences, have in common that they are hierarchically organized and allocate people to positions in a single rank-order. This hierarchical rank-order of individuals corresponds to the theoretical notions of job queue (Thurow, 1975) or, in the case of assortative mating (Kalmijn, 1994), candidate queue. The position of individuals in this hierarchy is determined by the relative value of qualifications. In case of increased demand, however, educational qualifications may become subject to congestion or crowding ('credential inflation'). It is therefore not the absolute value of a person's education that counts, but its relative value compared to that of competitors in the queue. This logic provides the rationale that in all countries education levels are hierarchically ordered on a one-dimensional scale, which informs the derivation of ISLED.

Classic measurement theory

Methodologically, our optimization approach can be further justified as follows. In an indirect effects model, the total effect of inputs on outputs is the sum of the direct and the indirect effects. How much of the total effect is direct and how much indirect crucially depends on the quality of the mediating variable (Kelley, 1973). If the mediator is poorly measured, the direct effect is overestimated, while the indirect effect is underestimated. By this reasoning, minimizing measurement error equals minimizing the direct effect. We apply this argument to the optimal scaling of education categories. Starting from the assumption that the size of the real direct effect is an empirical matter, we conclude that if we want to establish its true size, we need to filter out the part of the direct effect that is caused by measurement error. As the size of this effect is inversely proportional to the amount of measurement error in the education variable, a scaling that yields larger direct effects of inputs on outputs and weakens the mediating role of education in the status attainment process, is suboptimal. A scaling, by contrast, that maximizes the intervening role of the education level and minimizes the direct effect, contains the least amount of measurement error and therefore yields the best measure.

2.5 Data sources and constructed variables

The European Social Survey is a high-quality survey that has been held biennially in 34 European countries starting in 2002. We use the data of the first four

rounds, referred to as ESS R1-R4, with some 198,000 available cases. On the basis of our selection criteria, excluding respondents under 25 and over 74 years of age as well as students and respondents without valid education data, we obtain an effective sample of 150,567 cases.

The ESS research design calls for two independent measurements of level of education: a country-specific classification and a duration measure. As the country-specific classification is post-harmonized into a five-category version of ISCED-97, the two measurements yield three different indicators in the data: the country-specific measures, their ISCED-based harmonization and the duration measure. The presence of two independent measurements of education level in the ESS allows us to apply latent variable modelling, which is required for a direct comparison of the three indicators as well as for the correction of measurement error. The ESS data are, moreover, particularly well suited for our purposes due to their richness in criterion variables.

The ESS education variables

Until ESS Round 5 it has been one of the policies of the ESS to leave countries the option to employ country-specific education typologies, which serve as source variables for post-harmonization. Countries were not instructed how to design their education showcards, but could use their own formats, the only requirement being that it could be recoded into the (seven) main ISCED-97 levels. For most countries the country-specific measures have been included in the main ESS data file. We will refer to them as EDLVXX, as for R1-4 the names of these variables in the ESS are EDLVAT...EDLVUA (XX is replaced by the ISO country abbreviations AT (Austria) to UA (Ukraine)). Across all countries we found 1,154 individual categories.

An inspection of these variables reveals a number of problems. First, countries have interpreted the recommended strategy in different ways. For Austria, Finland, Iceland, Slovenia, Turkey and the UK no detailed country-specific measure is available, or at least not for all rounds. The Irish, Italian and Ukrainian country-specific measures are available but turn out to be identical to their ISCED equivalent in at least one round. Second, for the remaining countries the number of categories distinguished in the country-specific measure varies from 5 for the UK to 19 for Luxembourg. This illustrates that the detail available and hence the information that can be lost in the harmonization process varies considerably between countries.

A third problem in processing the country-specific variables is that many countries have changed their variables between rounds. In fact, there are only three countries (Germany [6], the Netherlands and Sweden) that have not made any changes over the four rounds. Fortunately, the changes that have been made are easy to track, as ESS flags them by adding a character to the variable name: for instance, the variable names EDLVCH, EDLVaCH, EDLVbCH and EDLVcCH indicate that Switzerland changed its measurement system with every new round. Changes can be characterized either splits or mergers: splits occur when a category is divided into two or more branches and mergers when two or more categories that were distinct in one round are collapsed in a subsequent round. As can be seen in appendix 2.A we have processed this information by organizing it in a hierarchical digit system: if a category (say 4) is split in a new round, we refer to its branches as 4.1, 4.2 etc. If subcategories present in one round are merged in the next round, the reverse occurs and digits disappear. Not all changes, however, are simple splits or mergers. In particular, in the Estonian, French and Swiss cases, 'layered' splits occur, meaning that divisions created in one round are further split in the next round. This required the use of second and occasionally even third digits. A particular convenience of this digit system is that it allows us to estimate the level of the cruder category by averaging it with the individual values of its more detailed branch categories.

The largest common-denominator strategy employed by ESS is derived from and documented by ISCED-97. Until 2011 the ISCED measure in ESS used to be called EDULVL and contained seven categories (0 Less than primary, 1 Primary, 2 Lower Secondary, 3 Upper Secondary, 4 Post-secondary, 5 First stage of Tertiary, 6 Second stage of Tertiary). As ISCED-levels 0 and 1 as well as 5 and 6 could not always be properly identified due to a lack of differentiation in the country-specific source variables, these distinctions could not be maintained consistently across countries. For this reason, in a 2011 revision [7] of the data EDULVL was replaced by a five-category harmonization, EDULVLa. In EDULVLa levels 0 and 1 as well as levels 5 and 6 of the former EDULVL [8] are merged.

6 Note that the German country-specific variables are not included in the main ESS data files but must be retrieved from the country-specific files.

7 The same revision also introduced EISCED. EISCED is a variable that was developed by Schneider (2009) as an alternative simplification of detailed ISCED-97, which separates qualifications with access to tertiary education and qualifications without at upper secondary education and distinguishes between Bachelor and Master. Unfortunately, for Rounds 1-4 EISCED is not available for all countries, which is why we use EDULVLa for our comparisons.

8 We use the old EDULVL is used as country-specific measure where no alternative is available.

For the respondent, the ESS data contain an independent second education measure: duration (EDUYRS). The question asked is about the number of years (in "full-time equivalents") the respondent has spent in education. For our analyses we have truncated EDUYRS at 24 years in order to exclude improbably long durations.

The criterion variables

For the input side of the model we have chosen for parental occupations and education levels, yielding four variables. The ESS data of R1-3 include only one indicator of father's and mother's education, the harmonized ISCED, stored as variables EDULVLFa and EDULVLMa. While the harmonization process was the same as for the respondent, here country-specific source variables were not archived. In R4 many countries have complemented the harmonized variables with country-specific measures, but in order to preserve comparability, we have not taken this change into account. For parental occupations, two indicators are available in ESS: a crude precoded measure (OCCF14 and OCCM14, with two revisions) and a detailed code, measured in ISCO-88 (ISCOCOF and ISCOCOM) [9]. To process this occupational information, we have converted all of it into the International Socio-Economic Index of occupational status [ISEI] (Ganzeboom et al., 1992, 1996). We averaged the two ISEI indicators for fathers and mothers, respectively, before using them as criterion variables.

For the output side of the model, we have chosen respondent's occupation and partner's education. The respondent's occupation too is measured in ISCO-88 (ISCOCO), which we have converted into ISEI-scores. The education level of the partner is again measured in a harmonized ISCED format (EDULVLaP).

2.6 Algorithm and models

Optimal scaling

The algorithm we use to find the optimal scaling of education categories, our first method, is a variation of the algorithm used for the development of the ISEI index for occupational status, which was developed for this purpose by De

9 The ESS data contain detailed parental occupations for the most part as uncoded strings. This information has now been coded into ISCO-88 (Ganzeboom, 2009). Crude and detailed measures do not differ substantially in measurement quality. The coded parental occupation data are available at www.harryganzeboom.nl/essdevo.

Leeuw (in Ganzeboom et al., 1992). Here occupational status was defined and calculated as the optimal scaling of occupations: ISEI is the scaling of occupations that mediates best the influence of education on income. In our application to derive ISLED, we first reduce complexity by assembling the unweighted averages of the standardized input variables and then of the standardized output variables in two composite indices. In order to lose as little information as possible, we have used an available-case strategy, meaning that the criterion indices average whatever is available as inputs or outputs. The optimal scale score is a weighted average of the Z-standardized composite inputs and composite outputs; the optimal solution is found by updating the relative weights of the input and output composites. This is done by systematic search in a few iterative steps in an OLS regression. The search stops when the remaining direct effect of inputs on outputs is at a minimum. In the ESS data this happens to be the case for 0.61 (inputs) and 0.39 (outputs). These weights are constrained to be the same for all countries and all rounds [10].

The resulting optimal scores are initially Z-standardized within countries, which makes levels of education comparable within, but not across countries. The within-country standardized metric may satisfy many needs (in particular when doing analyses on a country-by-country basis, or pooling an analysis of multiple countries), but will not allow the analyst to compare means and dispersions between countries, or to control for educational composition in a cross-national analysis. In order to accomplish these goals, a common cross-national metric needs to be established. We define this metric by calibrating the optimized scale upon an external measure, the duration measure EDUYRS, which is available in all ESS rounds and for all countries. Despite its somewhat poorer measurement quality (see below), the duration measure has the advantage of producing a remarkably stable image of between-country variations in the underlying educational distributions and of having directly comparable means and dispersions across contexts [11].

10 The finding that inputs obtain a higher weight may be somewhat surprising. The weights must not, however, be confused with correlations. Despite the lower weight, the output composite correlates more strongly (0.682) with ISLED than the input composite (0.508).

11 The calibration criterion is the mean duration per country over all four rounds. Not all countries have taken part in all rounds, so the time point of calibration ('Europe around 2005') is slightly different between countries. We did not adjust the means for representation of countries in rounds, because changes between rounds in mean duration are very minor.

The procedure to develop the comparable metric consists of two steps:

- Calibration: Define an intermediate metric Z* by equalizing country-spe cific means and dispersions between the estimated optimal scale and the duration measure:
  Z* = (Z(OPTI)+Mc(Z(EDUYRS))*SDc(Z(EDUYRS)),
  in which Mc and SDc represent the country-specific means and stand ard deviations of the duration distribution, and OPTI is the within-coun try optimal scale score.
- Transformation: After restandardizing Z* into an over-all Z, we project back into a 0..100 metric using the anti-logistic transformation:
  ISLED = 100*(exp(Z)/(1+exp(Z)).

As a result of the calibration step, country-specific means and dispersions of the ISLED distributions are proportional to those of the duration measure. As a result of the transformation step, the final scores range between 0 and 100 [12]. The anti-logistic transformation (Hauser & Warren, 1997) is preferred over a linear transformation because by reducing differences in scores at either extreme of the scale, we avoid out-of-range projections. Note that duration is only used to define the overall metric of the score distribution, but does not determine the relative distances between the score values of education categories within countries – these are solely determined by the association with the criterion variables. The ISLED scores thus obtained are now comparable within and between countries and can be interpreted as giving an indication of the relative value of educational qualifications (in Europe in as far as being represented in the ESS). We label them ISLED, the International Standard Level of Education, because the scores are comparable between countries and designate the value of each and every education level represented by the individual country-specific categories that we have scaled on a one-dimensional international educational hierarchy.

Table 2.1 presents the means and standard deviations of ISLED per country, together with those of the duration measure on which they are based.
Mean levels of education are fairly similar between most European countries, with Portugal and Turkey as striking exceptions. Iceland has the highest educated population (58.7), closely followed by Norway (57.4). Italy (43.4), Greece (40.8) and Spain (43.4) trail behind the main pack of countries. Portugal (25.2) and Turkey (22.4) are outliers by a substantial distance. The dispersions vary much more between countries. The greatest contrast can be found between the

12 The extreme values 0 and 100 do not arise. The empirically found extremes are 4 and 97.

Table 2.1: Average level of education per country, ESS R1-4 (age 25-74)

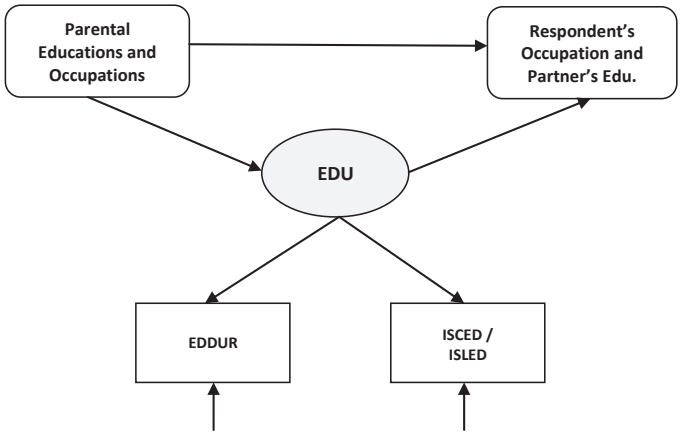
ISO	Country	N	EDUYRS		ISLED	
			Mean	*SD*	*Mean*	*SD*
AT	**Austria**	5177	12.5	3.1	51.8	16.9
BE	**Belgium**	5388	12.6	3.7	52.1	20.3
BG	**Bulgaria**	2940	11.3	3.5	46.6	18.5
CH	**Switzerland**	6279	11.7	3.7	48.0	18.9
CY	**Cyprus**	1787	12.0	3.8	48.6	20.7
CZ	**Czech Republic**	5140	12.5	2.5	51.7	13.7
DE	**Germany**	8849	13.5	3.3	56.0	17.2
DK	**Denmark**	4767	13.5	4.1	56.8	20.8
EE	**Estonia**	3809	12.7	3.2	52.7	17.2
ES	**Spain**	5903	11.4	5.1	43.4	25.3
FI	**Finland**	6083	12.9	4.0	54.2	20.9
FR	**France**	5799	12.4	4.0	50.9	20.8
GB	**United Kingdom**	6605	13.2	3.5	55.4	18.9
GR	**Greece**	5561	10.5	4.4	40.8	22.6
HR	**Croatia**	1119	11.7	3.7	48.3	19.8
HU	**Hungary**	4810	12.0	3.6	49.0	19.0
IE	**Ireland**	6146	13.1	3.6	54.8	18.9
IL	**Israel**	3463	13.3	3.6	55.5	19.5
IS	**Iceland**	420	13.8	4.3	58.7	21.4
IT	**Italy**	2163	10.9	4.5	43.4	22.9
LT	**Lithuania**	1516	12.8	3.3	53.1	17.8
LU	**Luxembourg**	2283	11.8	4.2	48.1	21.4
LV	**Latvia**	2868	12.4	3.4	51.3	18.3
NL	**Netherlands**	6511	13.1	4.0	55.2	20.7
NO	**Norway**	5498	13.7	3.7	57.4	19.1
PL	**Poland**	5188	12.0	3.4	49.3	18.3
PT	**Portugal**	6115	7.8	4.8	25.2	22.4
RO	**Romania**	3252	11.4	3.7	45.9	20.0
RU	**Russia**	3704	12.6	3.0	52.2	16.6
SE	**Sweden**	5701	12.8	3.5	53.3	19.1
SI	**Slovenia**	4207	11.7	3.6	48.3	19.3
SK	**Slovakia**	3809	12.5	3.1	52.1	16.4
TR	**Turkey**	3181	6.2	4.2	22.4	18.9
UA	**Ukraine**	4526	12.1	3.3	50.0	17.9
Total / average		**150,567**	**12.1**	**4.0**	**49.7**	**21.0**

Southern European countries with wide distances between the lower and higher educated and Eastern European countries with much more compressed educational distributions.

Latent variable modelling

In the modelling part of our analysis, where we apply our second method, we examine the measurement quality of education indicators using an indirect

Figure 2.2: Modelling level of education: a latent variable indirect effects model



Note: EDDUR=duration of education;
ISCED=International Standard Classification of Education;
ISLED=International Standard Level of Education
The duration measure is the first indicator in all models, while the second indicator is ISCED or ISLED respectively.

effects latent variable model (Figure 2.2). The model consists of two parts, a measurement part and a structural part. The measurement model illustrates how the latent education variable (represented by an oval) is reflected in two indicators (represented by rectangles). In one model we combine EDUYRS with ISLED, in another with EDULVLa (the ISCED-97 based harmonization in ESS R1-4). The measurement model with two indicators is not identified in itself, but becomes identified when we embed it in a structural model, by including input and output variables, the criterion variables introduced above. We estimate the parameters using Full Information Maximum Likelihood (FIML) in LISREL 8.8 (Jöreskog & Sörbom, 1996). The FIML approach computes a casewise likelihood function using only those variables that are observed for a given case (Enders & Bandalos, 2001). The estimates of the parameters are weighted with the N of the pertinent correlations: if the estimate is based on a larger N, it gets a small standard error, whereas an effect that models correlations with a smaller N, gets a large standard error.

We can assess the relative measurement quality of indicators by comparing their measurement coefficients. These are inversely related to the (attenuated) size of the structural coefficients in single indicator models and can be interpreted as

(dis)attenuation coefficients. For reasons of exposition, we precede the double indicator models by showing the three separate single indicator models. We can assess measurement quality by comparing the explained variance in education level and the explained variance by education level, with higher amounts of explained variances signifying better indicator quality. A related way of assessing indicator quality is the comparison of effect sizes. The smaller the direct effects of inputs on outputs and by the same token, the larger the indirect effects via education, the better the indicator. The double-indicator latent variable model allows us to diagnose and correct random measurement error. As even a small amount of random error may have large consequences in terms of the attenuation of structural coefficients (Allison & Hauser, 1991), error correction should be worth our while. We will show that this is the case here as well. The latent variable model takes our principle of fully using all available information one step further. Rather than restricting ourselves to comparing single indicators, we make use of the extra information contained in a second indicator. Provided that they are based on independent measurement, even suboptimal measures will contribute some information that is not tapped by the other indicator.

2.7 Results

We present our findings in two sections. In the first section, we discuss one country, Germany, in detail, while in the second section we briefly discuss the results across countries.

An example: Germany

We have chosen Germany as our example because its country-specific variable in the ESS is by far the most complex and in our rendition ultimately the most detailed one too. For Germany therefore a maximum amount of information is lost through harmonization, or vice versa can be retained through scaling. This makes the German case particularly well suited to demonstrate the points we are trying to make. By comparison the country-specific education variables for the other ESS countries are straightforward and self-explanatory.

The German country-specific question has been asked in exactly the same format in each round. It consists of two separate questions: one on the highest school qualification and one on the highest vocational qualification. To exploit all the information contained in the two questions, we constructed a combined

Table 2.2: Summary of the German country-specific education categories: ESS R1-4 (N=8,849)

1	2	3	4	5	6	7	8	9	10	11	12	13
Cat	ISCED	N R1	N R2	N R3	N R4	Country specific education category	OPTI R1	OPTI R2	OPTI R3	OPTI R4	OPTI	ISLED
0	0	42	61	48	44	**Grundschule nicht beendet***	-1.622	-1.640	-1.471	-1.551	-1.568	**26.9**
1	2	104	108	90	76	**Hauptschule**	-1.328	-1.364	-1.353	-1.376	-1.344	**37.4**
1.1	3	18	23	34	19	**Hauptschule + *Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre***	-1.637	-1.508	-1.447	-1.307	-1.460	**28.7**
1.2	3	20	28	13	22	**Hauptschule + *Teilfacharbeiterabschluss***	-1.161	-1.645	-1.223	-1.619	-1.449	**28.9**
1.3	3	346	324	364	281	**Hauptschule + *Abgeschlossene gewerbliche oder landwirtschaftliche Lehre***	-1.096	-1.046	-0.997	-1.233	-1.079	**35.4**
1.4	3	129	138	126	115	**Hauptschule + *Abgeschlossene kaufmännische Lehre***	-0.623	-0.405	-0.522	-0.747	-0.565	**45.5**
1.5	2	5	6	2	3	**Hauptschule + *Berufliches Praktikum, Volontariat***	-0.759	-0.821	-1.865	-0.474	-0.795	**40.9**
1.6	5	34	29	29	16	**Hauptschule + *Fachschulabschluss***	-0.494	-0.598	-0.092	-0.481	-0.420	**48.5**
1.7	3	43	30	23	30	**Hauptschule + *Berufsfachschulabschluss***	-0.768	-0.678	-0.158	-0.809	-0.642	**44.0**
1.8	5	55	42	41	33	**Hauptschule + *Meisterabschluss***	-0.700	-0.500	-1.001	-0.724	-0.726	**42.3**
2	3	43	21	33	60	**Realschule**	-0.314	-0.784	-0.383	-0.194	-0.338	**54.5**
2.1	3	4	7	11	7	**Realschule + *Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre***	0.736	0.224	-0.519	-0.432	-0.125	**54.5**
2.2	3	3	4	6	3	**Realschule + *Teilfacharbeiterabschluss***	-0.240	-0.611	-0.500	-1.378	-0.642	**44.0**
2.3	3	247	230	268	233	**Realschule + *Abgeschlossene gewerbliche oder landwirtschaftliche Lehre***	-0.351	-0.330	-0.533	-0.573	-0.448	**47.9**
2.4	3	228	206	250	232	**Realschule + *Abgeschlossene kaufmännische Lehre***	0.258	0.029	0.072	-0.110	0.057	**58.1**
2.5	2	8	2	9	1	**Realschule + *Berufliches Praktikum, Volontariat***	0.491	-0.128	-0.344	2.201	0.115	**59.3**
2.6	5	103	112	91	82	**Realschule + *Fachschulabschluss***	0.243	0.142	0.287	0.242	0.218	**61.3**
2.7	3	66	55	74	67	**Realschule + *Berufsfachschulabschluss***	-0.209	0.110	0.112	0.333	0.079	**58.6**
2.8	5	79	69	47	67	**Realschule + *Meisterabschluss***	-0.088	0.055	-0.274	-0.150	-0.102	**54.9**
3	3	5	3		8	**Fachhochschulreife**	1.881	0.675		-0.435	0.396	**62.3**
3.1	3		1	2		**Fachhochschulreife + *Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre***		-1.199	-0.026		-0.011	**56.8**
3.3	3	8	6	13	8	**Fachhochschulreife + *Abgeschlossene gewerbliche oder landwirtschaftliche Lehre***	0.621	-0.344	-0.026	-0.446	-0.011	**56.8**
3.4	4	20	20	14	22	**Fachhochschulreife + *Abgeschlossene kaufmännische Lehre***	0.026	-0.131	0.703	0.253	0.171	**60.4**
3.5	5		3		3	**Fachhochschulreife + *Fachschulabschluss***		0.235		0.619	-0.011	**56.8**
3.6	4	19	24	13	21	**Fachhochschulreife + *Berufsfachschulabschluss***	0.447	0.687	0.487	0.343	0.492	**66.4**
3.7	4	15	10	14	16	**Fachhochschulreife + *Berufliches Praktikum, Volontariatpracticum***	0.370	0.385	0.565	0.509	0.453	**65.7**
3.8	5	24	22	5	15	**Fachhochschulreife + *Meisterabschluss***	0.354	-0.116	0.665	-0.013	0.140	**59.8**
4	3	12	12	20	25	**Abitur**	1.222	0.605	0.606	0.765	0.751	**71.1**
4.1	4	1	1	3		**Abitur + *Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre***	1.806	-0.429	1.678		0.630	**68.9**
4.3	4	15	11	21	14	**Abitur + *Abgeschlossene gewerbliche oder landwirtschaftliche Lehre***	0.863	0.511	0.472	0.573	0.630	**68.9**
4.4	4	29	40	42	47	**Abitur + *Abgeschlossene kaufmännische Lehre***	0.733	0.921	0.833	0.748	0.800	**71.8**
4.5	4	1	1	4	1	**Abitur + *Berufliches Praktikum, Volontariatpracticum***	-0.967		1.003	0.192	0.630	**68.9**
4.6	5	24	28	20	23	**Abitur + *Fachschulabschluss***	0.810	0.609	1.324	0.762	0.830	**72.3**
4.7	4	16	8	10	10	**Abitur + *Berufsfachschulabschluss***	0.797	0.320	1.680	0.694	0.874	**73.0**
4.8	5	19	16	9	6	**Abitur + *Meisterabschluss***	0.773	0.548	0.342	0.577	0.589	**68.2**
5	5	127	148	163	197	**Fachhochschule**	0.729	0.929	0.933	0.793	0.836	**72.4**
6	5	77	74	65	100	**Hochschule/Universität: Zwischenprüfung, Vordiplom; Bachelor**	1.691	1.626	1.609	1.149	1.469	**81.5**
7	5	243	229	211	238	**Abgeschlossenes Studium an Hochschule, Universität, Akademie, Polytechnikum (Diplom, Magister, Master, Staatsexamen)**	1.729	1.914	1.782	1.602	1.732	**84.5**
8	5	31	27	33	41	**Promotion; Habilitation**	2.611	2.805	2.961	2.713	2.737	**92.5**

OPTI-R1 –R2 –R3 –R4: optimal scale scores per round; OPTI: average optimal score
*The category 'Grundschule beendet', without finishing any further education (ISCED 1) does not occur in the ESS data

variable, which is listed in column 7 of Table 2.2 [13] (column 1 assigns a number to each category and columns 3-6 present the number of selected respondents per round). Category 0 (Grundschule nicht beendet), the lowest level, as well as the four tertiary education categories 5-8: (Fachhochschule, Bachelor, Master, Promotion) remain undifferentiated. Together with the four secondary school levels (categories 1-4: Hauptschule, Realschule, Fachhochschulreife, Abitur), this yields nine main levels in German education. The four secondary levels have each been combined with eight types of non-university vocational training, resulting in a potential 32 subcategories. Two of these combinations are not filled and others have very small counts. With as many as 39 effective categories we have, however, obtained a very detailed variable indeed, which preserves the available information as fully as possible.

The first set of results for Germany can be found in Columns 8-11 of Table 2.2, headed OPTI-R1-4, and provide the optimal scale scores per category and round. Per category the scale scores are then averaged across rounds, producing OPTI in column 12. In column 13 OPTI is transformed into ISLED, yielding values ranging from 26.9 to 92.5. The results show that the nine main education levels discerned in the German country-specific variable are strictly hierarchically scaled by the criterion variables and correspond to the implicit ordering of the presented answer categories. The values of the sublevels, by contrast, vary considerably per round and do not always follow the nominal hierarchy either. It can, however, be seen that sublevels of the same type (for example 1.5, 2.5, 3.5 and 4.5) are hierarchically ordered among themselves. This implies that although the vocational qualifications attained are actually identical, differences in the preceding general education dominate the ultimate scale scores.

Table 2.3 presents the results of five pertinent simultaneous equation models for Germany, each consisting of three standardized regression equations, with education level, occupation and education level of the partner being the three dependent variables. Models 1-3 are single indicator models, which alternately use one of the three different indicators, EDUYRS, EDULVLa and ISLED. Models 4 and 5 are double indicator models, whereby model 4 combines EDUYRS with EDULVLa and model 5 EDUYRS with ISLED.

When comparing the models, we can consider the measurement coefficients, the explained variance for the separate equations or the size of the regression

13 All the information in table 2.2 can also be found in appendix 2A, where this information is available for all countries.

coefficients. On all accounts, ISLED turns out to produce the best results. The measurement coefficients for the three indicators in models 4 and 5 are: 0.812 [14] (EDUYRS), 0.803 (EDULVLa) and 0.946 (ISLED). These coefficients provide direct insight into the loss of information we suffer per indicator, which can be expressed in percentage points: EDUYRS causes 19%, EDULVLa 20% and ISLED 5% attenuation of any covariance based association in the German data.

The better quality of ISLED is already visible in the single indicator models 1-3. Here it is reflected in higher levels of explained variance. Compared with EDUYRS, ISLED explains more of the variance in all dependent variables: 5% more in respondent's education, 6% more in partner's education and 11% more in respondent's occupation. ISLED's quality can also be observed in the effect sizes. Compared with models 1 and 2, in model 3 (ISLED) the indirect effect that is mediated by education level is largest: ISLED produces the lowest direct effects of parental educations and occupations on respondent's education, as well as by respondent's education on occupation and education of the partner. Accordingly, the indirect effects of parental education on respondent's and partner's education and parental occupation on respondent's occupation are larger. The differences between EDULVLa and EDUYRS are somewhat less marked, but for Germany, EDUYRS performs better than EDULVLa. EDULVLa's poor performance may be explained by the fact that the new revised harmonization EDULVLa contains very little detail because it lumps most secondary as well as tertiary educations together, disguising distinctions that are particularly relevant in the German case.

In models 1-3 we have followed other researchers (e.g. Kerckhoff & Dylan, 1999 and Schneider, 2009) in assessing measurement quality by using single indicators. We now go a step further and examine what happens when we proceed to double-indicator models. In model 4 EDULVLa is combined with EDUYRS, which has a mixed, but only small effect on the explained variance in the dependent variables, which is either marginally higher (respondent's education and occupation) or slightly lower (partner's education) than in model 3. By contrast model 5, where we combine EDUYRS with ISLED instead of EDULVLa, improves the results more visibly. Compared with model 4 the explained variance is higher in all three dependent variables, by an average of 3%. These results show that double-indicator models produce better results than any single indicator

14 We chose the lower values from models 4 and 5 because we regard them as the most accurate, arguing that if the second indicator is of poorer measurement quality, the measurement quality of the duration measure is overestimated.

Table 2.3: Model parameters for GERMANY, ESS R1-4 (N=8,849)

	Single indicator models			Double indicator models	
	1	2	3	4	5
	EDUYRS	EDULVLa	ISLED	EDUYRS EDULVLa	EDUYRS ISLED
A. STRUCTURAL MODELS					
INDEPENDENT VARIABLES	**DEPENDENT VARIABLES**				
	(1) Respondent's education				
Father's Education	0.166	0.152	0.205	0.188	0.209
Mother's Education	0.081	0.054	0.091	0.072	0.088
Father's Occupation	0.163	0.151	0.176	0.201	0.198
Mother's Occupation	0.140	0.119	0.143	0.161	0.195
R^2	**0.213**	**0.161**	**0.267**	**0.273**	**0.302**
	(2) Spouse's education				
Father's / Mother's Education*	0.138	0.164	0.104	0.107	0.082
Respondent's Education	0.138	0.324	0.478	0.469	0.527
R^2	**0.291**	**0.260**	**0.348**	**0.341**	**0.377**
	(3) Respondent's occupation				
Father's / Mother's Occupation*	0.097	0.117	0.043	0.039	0.012#
Respondent's Education	0.500	0.481	0.641	0.645	0.703
R^2	**0.354**	**0.348**	**0.463**	**0.464**	**0.509**
B. MEASUREMENT MODELS					
INDICATOR	**MEASUREMENT COEFFICIENTS**				
EDUYRS	**1**			**0.862**	**0.812**
EDULVLa		**1**		**0.803**	
ISLED			**1**		**0.946**
C. FIT STATISTICS					
RMSEA	0.029	0.033	0.026	0.030	0.026

Completely standardized parameters. # not significant. *Effects constrained to be equal.
EDUYRS: duration, EDULVLa ISCED-harmonization), ISLED: optimal scaling of country-specific measures.

and that the combination of EDUYRS and ISLED yields the best results. Effect sizes increase accordingly, with effects of parental educations and occupations on respondent's education, as well as effects of the latter on occupation and partner's education increasing, while the direct effect of parental occupations on respondent's occupation decreases and in fact becomes insignificant. For Germany this it is even true that if education level is measured and modelled appropriately, no such direct effect remains.

Model 5 also shows that EDUYRS, despite being a relatively poor indicator, still contributes some information, even when it is combined with ISLED. If the duration question were only a weak measurement of education level and ISLED a perfect one, the measurement coefficient for ISLED would equal 1.0. A deviation by 5% may not seem much, but it still has a noticeable impact on the estimated

Table 2.4: Model parameters for ALL COUNTRIES, ESS R1-4 (N=150,567)

	Single indicator models			Double indicator models	
	1	2	3	4	5
	EDUYRS	EDULVLa	ISLED	EDUYRS EDULVLa	EDUYRS ISLED
A. STRUCTURAL MODELS					
INDEPENDENT VARIABLES	**DEPENDENT VARIABLES**				
	(1) Respondent's education				
Father's Education	0.191	0.198	0.204	0.218	0.215
Mother's Education	0.165	0.155	0.165	0.173	0.173
Father's Occupation	0.137	0.128	0.149	0.154	0.161
Mother's Occupation	0.093	0.092	0.112	0.109	0.119
R^2	**0.234**	**0.224**	**0.269**	**0.291**	**0.302**
	(2) Spouse's education				
Father's / Mother's Education*	0.130	0.129	0.109	0.091	0.088
Respondent's Education	0.423	0.437	0.477	0.523	0.525
R^2	**0.325**	**0.337**	**0.358**	**0.388**	**0.387**
	(3) Respondent's occupation				
Father's / Mother's Occupation*	**0.095**	0.093	0.059	0.048	0.036
Respondent's Education	**0.501**	0.520	0.594	0.614	0.642
R^2	**0.348**	**0.367**	**0.420**	**0.433**	**0.455**
B. MEASUREMENT MODELS					
INDICATOR	**MEASUREMENT COEFFICIENTS**				
EDUYRS	**1**			**0.878**	**0.859**
EDULVLa		**1**		**0.892**	
ISLED			**1**		**0.949**
C. FIT STATISTICS					
RMSEA	0.021	0.020	0.015	0.016	0.018

Completely standardized parameters. *Effects constrained to be equal.
EDUYRS: duration, EDULVLa: ISCED-harmonization), ISLED: optimal scaling of country-specific measures.

coefficients (cf. model 5 with model 3). This result shows that duration contains some information relevant to the status attainment process that is unique for this indicator.

Results across countries

After having discussed the German case in some detail, we now briefly consider the remaining countries jointly. Table 2.4 provides the results for the simultaneous equation models for all countries combined. Like the German table, it reveals how the various indicators differ in measurement quality and how they affect explained variance and effect sizes accordingly. The results are clear and unequivocal: ISLED outperforms EDULVLa and EDUYRS by a considerable margin. For the pooled sample the measurement coefficients are:

	Measurement	Attenuation
EDUYRS	0.859	14.1%
EDULVLa	0.892	10.8%
ISLED	0.949	5.1%

With 5% loss, ISLED produces the best measurement quality of the three single indicators. Note that in contrast with Germany, for all countries combined, EDULVLa performs better than EDUYRS. Also note that both EDUYRS and EDULVLa perform better in the rest of ESS than for the German data.

Again we observe that among the single indicators ISLED (model 3) produces the largest explained variances in all three dependent variables, which comes with the familiar effect pattern: ISLED produces the largest indirect and smallest direct effects. Just like in the German case, here too ISLED is outperformed by double indicator models 4 and 5. In contrast to Germany, for all countries combined, parental occupations continue to have a significant (albeit small) direct effect on respondent's occupation. It must be stressed again, however, that it is double-indicator modelling that tops off measurement quality.

These findings have an important ramification for the interpretation of the results we achieve using ISLED. If latent variable modelling produces benchmark unattenuated measurement, ISLED on its own does not quite match this result, but comes much closer to it than the other two indicators. This illustrates that although the criterion variables used in the validation model are the same as those used for the derivation procedure, ISLED by no means overestimates education effects, but rather still attenuates them.

Table 2.5 presents the measurement coefficients for the three indicators per country, which can again be directly translated into attenuation factors.

The results are surprisingly consistent across countries. ISLED outperforms both EDUYRS and EDULVLa in all countries, except for Greece, where EDULVLa just about surpasses ISLED by 2 points in the third decimal. How well ISLED does for a given country, is of course dependent on the country-specific source variables. The differences in quality that we find, are attributable to how well the respective country-specific variables represent a given national education system. In this sense the quality of ISLED is bounded by these source variables. In countries

Table 2.5: Measurement coefficients for the three different education indicators by country, ESS R1-4 (N=150,567)

ISO	INDICATOR		
	EDUYRS	EDULVLa	ISLED
AT	0.880	0.921	0.949
BE	0.763	0.941	0.969
BG	0.960	0.956	0.978
CH	0.785	0.790	0.928
CY	0.923	0.961	0.974
CZ	0.849	0.881	0.972
DE	0.812	0.804	0.946
DK	0.780	0.847	0.907
EE	0.903	0.857	0.921
ES	0.880	0.926	0.945
FI	0.884	0.876	0.901
FR	0.836	0.892	0.961
GB	0.785	0.859	0.908
GR	0.930	0.969	0.967
HR	0.863	0.917	0.967
HU	0.880	0.913	0.978
IE	0.835	0.887	0.937
IL	0.892	0.882	0.972
IS	0.808	0.848	0.952
IT	0.953	0.958	0.963
LT	0.880	0.847	0.962
LU	0.878	0.926	0.960
LV	0.832	0.874	0.942
NL	0.784	0.898	0.934
NO	0.872	0.870	0.914
PL	0.937	0.934	0.980
PT	0.958	0.969	0.974
RO	0.918	0.935	0.956
RU	0.909	0.847	0.983
SE	0.898	0.899	0.938
SI	0.868	0.907	0.960
SK	0.774	0.908	0.977
TR	0.936	0.951	0.961
UA	0.767	0.843	0.972
M	**0.865**	**0.897**	**0.953**
SD	**0.059**	**0.046**	**0.023**

such as France, Estonia, Germany, Luxembourg and Switzerland, which have the most detailed source variables, the potential gain in measurement quality by using ISLED is most pronounced.

2.8 Conclusions and discussion

It was our goal to improve upon the state of the art of the comparative measurement of education level. We have proposed two complementary but independent methods to achieve this goal. With the first method we measured the value of each category of the ESS country-specific education variables by means of optimal scaling, resulting in a novel high-quality single indicator: ISLED. With the second method we modelled education level as a latent variable with double indicators, resulting in unattenuated measurement coefficients. These two methods share a common maxim: the full exploitation of all available information. The first method, optimal scaling, makes use of all extra detail contained in the country-specific education measures. Across all ESS countries the derived variable ISLED has been found to outperform both EDULVLa (ISCED harmonization) and EDUYRS (duration) by some distance. The second method, latent variable modelling, makes use of the unique information contained in each indicator. This method has been found to have the edge over the standard single ESS indicators available in R1-4, as well as over ISLED, albeit to a lesser degree. We conclude that together the two methods lead to a significant improvement of the state of the art in the measurement of level of education.

While the results presented here are clear and promising, we acknowledge a number of limitations. Some limitations pertain to the measurement, others to the modelling part of our analyses. Concerning the measurement part, a first limitation is that the analyses have so far been confined to European countries in the ESS. We would like to stress that the intent is to produce ISLED scores for all countries where pertinent data are available. Analyses for a wider range of countries are possible with for example the 2009 Social Inequality module data from the International Social Survey Project [ISSP].

A second limitation is that we compared ISLED to EDUYRS and EDULVLa, both of which are known to be of poor quality, which may portray ISLED in too favourable a light. In Round 5 ESS has introduced two new common denominator harmonisations, EISCED and EDULVLb, with which ISLED still needs to be compared. As they are not (EDULVLb) or only partially (EISCED) available for R1-4, we did not include them in the analyses reported here. We plan, however, to

make up for this in a forthcoming study (Schröder & Ganzeboom, 2012b), where we analyse the ESS-R5 data [15].

A third limitation is that we present validation models for ISLED, which use the same data that were used for its derivation. An important way of further testing ISLED would be to apply it to fresh data. First results by Schröder & Ganzeboom (2012c) [16] with the ISSP 2009 Social Inequality data are promising and suggest that ISLED can be successfully applied to fresh data, with compatible education categories. We will continue to test ISLED and invite other researchers to do so as well.

A fourth limitation is that ISLED has not yet been tested with different criterion variables, variables that is, which were not involved in its derivation. Although it was derived within a status attainment model, we expect that ISLED, just like ISEI for occupations, is not limited to social stratification research, but can in principle be applied in any research context. The reason for this is that in essence ISLED, just like any other education indicator, measures educational resources that are important in determining outcomes, be it in stratification, attitudes and values, cultural participation or health (to name but a few). We believe that it is always one and the same (latent) education level that is tapped by no matter what education measure. Education effects are merely captured by different measures to different degrees. We are therefore confident that ISLED can be applied in non-stratification contexts as well. Whether it will produce superior results in these other contexts too, remains to be seen.

The most important limitation concerning the modelling part of our analyses is that we could only correct random measurement error. Measures may, however, also contain systematics measurement error. In order to be able to estimate and correct that, we need to repeat the measurement error, which requires the availability of double measures not only for the respondent but also for another person, for example the partner. Unfortunately, the ESS data do not contain this kind of information. Schröder & Ganzeboom (2012a) [17] present some first results on the impact of systematic measurement error, using Dutch ISSP data, which contain a duration as well as a country-specific education measure for both respondent and partner.

15 Chapter 3 of this dissertation. Here we assign ISLED scores to the categories of the much more detailed ISCED-2011.

16 Chapter 5 of this dissertation.

17 Chapter 4 of this dissertation.

A conclusion to be drawn from the measurement part of our analyses is that the detail contained in education measures is of crucial importance. This leads us to some general recommendations concerning both data collection and analysis. As regards data collection, we conclude that education data should be collected with as much country-specific detail as possible – very much along the way ESS has been heading. If country-specific variables are harmonized, the country-specific source variables should remain available in the data so that they can be used. In the data analysis, this country-specific detail can be matched with ISLED (as documented by ISLED 2012) and promises to reduce attenuation by measurement error in the analysis. We therefore recommend the use of ISLED as a single indicator in any quantitative comparative study that involves education level as an independent, dependent or control variable.

A conclusion to be drawn from the modelling part of our analyses is that ignoring measurement error amounts to no less than negligence. While latent variable procedures for estimating and correcting measurement error are common practice in the research on attitudes, we plead for an equally meticulous procedure for the measurement of social background variables. This leads us to further recommendations concerning data collection and analysis. Anybody setting out to collect new data would be advised to collect double indicators of social background variables. The good news is that with this method the mere presence of two parallel indicators is sufficient. Provided that they are based on independent measurements, their individual measurement quality becomes less of an issue. Concerning data analysis, we plead for latent variable modelling, wherever feasible. Even the addition of a weaker parallel measure, such as duration, as a second indicator leads to higher measurement quality of the education variable than the perfection of any individual indicator. Latent variable models have the advantage that they do not require any lengthy procedure to try and fix poor quality measures. Not only do such models make it possible to estimate the amount of measurement error, they also allow for its correction and thereby produce unattenuated coefficients.

Since our analyses clearly demonstrate how much we can gain in terms of explained variance and regression coefficients, we hope to have increased awareness of the problems caused by measurement error in social background variables and possible remedies for it. While latent variable models deserve preference, we realize that it is unrealistic to expect that all researchers will apply the simultaneous equation modelling techniques required for the correction of measurement error. Given that we have also achieved some considerable

improvement of measurement quality through optimal scaling, in appendix 2A we provide country registers with ISLED scores for each education category contained in the ESS R1-4 data, which as continuous indicators are ready to be applied statistical analyses. The application of these ISLED scores will, we believe, like the familiar ISEI scores for occupations, noticeably improve empirical results.

Chapter 3

Measuring and Modelling Level of Education in European Societies Revisited: Exploring the Potential of ISCED-2011

Chapter 3 [18]

Measuring and Modelling Level of Education in European Societies Revisited: Exploring the Potential of ISCED-2011

In a recent contribution, Schröder & Ganzeboom (2014) propose two methods to improve the measurement of education in comparative social research. First, they develop a new continuous scale for level of education in European countries, the International Standard Level of Education [ISLED], constructed as an optimal scaling of all detailed qualifications contained in the European Social Survey, Rounds 1-4. Second, they estimate a latent variable model of education, using ISLED and a duration measure as two independent indicators. The present article develops an alternative version of ISLED using ESS-R5 and applies the same methodology to examine its quality. We conduct our analysis in three steps. In the first step, we optimally scale all ESS-R5 qualification indicators, both the detailed country-specific measures and the various cross-national harmonizations. In a second step, we combine measures in a latent-variable model, which allows us to assess the measurement quality of each indicator. The optimally scaled country-specific variable turns out to be the best measure, but is closely followed by the two new ESS-R5 harmonizations. Since the most detailed new harmonization in ESS-R5 is based on UNESCO's recently launched International Standard Classification of Education (ISCED-2011), the new ISLED scores produce a universally applicable standard measure which can easily be transferred to other surveys. In a third and final step, we estimate the structural coefficients in the intergenerational status attainment model, alternating the education measures. Like Schröder & Ganzeboom (2014) we find that that using the ISLED scale works well, but also that a latent variable model of education is best.

3.1 Introduction

Measuring level of education in survey research is not an easy task. While this is already true of national education systems, the task becomes daunting when national systems are to be made comparable across countries. What makes this so challenging is the sheer endless number of current as well as historical national education programmes that need to be harmonized. Given the complexity of

18 This chapter is co-authored by Harry B.G. Ganzeboom. A first version (Schröder & Ganzeboom, 2012b) was presented at the ESS Quality Enhancement Meeting Education in Mannheim (Germany) in 2011.

many education systems as well as the large structural variations found among them (Allmendinger, 1989; Shavit & Müller, 1998), accommodating all the different programmes and qualifications into a common frame almost inevitably causes loss of information. This loss of information is a form of measurement error which may lead to substantial bias in regression coefficients (Allison & Hauser, 1991). Exactly how much information is lost, depends on the respective method used and is subject to empirical investigation.

In this article we try to answer the question how level of education can best be measured and modelled in cross-nationally comparative survey research. In particular, we compare the measurement quality of the various education indicators employed in the European Social Survey (2011) Round 5 (ESS-R5). The ESS is a leading social attitudes survey that has been held biennially in 35 countries since 2002 and that has invested increasingly in the proper measurement of education across its five rounds. We use the R5 data because in this round ESS introduced new, much more detailed country-specific indicators of level of education, as well as two new cross-national harmonizations, which makes the data particularly well suited for our purposes.

While ESS's attempt to improve measurement quality and hence the introduction of new indicators undoubtedly has its merits, the ESS is also a good illustration of what can go wrong in comparative measurement. Although on balance matters have demonstrably improved (see below), the new harmonizations have certainly not been successful on all accounts. A major problem in the ESS remains that at present none of the harmonized variables is actually available for all countries and rounds. Consequently, researchers who want to harmonize across all countries and/or rounds are left to their own devices. While the ESS deserves praise for undertaking and documenting its revision efforts, it remains a challenge for the user to keep an overview of what has been going on. A concise overview of all changes in the measurement of education is lacking and researchers have to delve deeply into the often extensive documentation, provided by the ESS individually per round and country. It is an additional aim of this article to fill this gap and provide guidance through the maze of ESS education indicators, each of which contributes some insight relevant to the issue of measurement under discussion here.

Recently, Schröder & Ganzeboom (2014) have proposed a novel (single) indicator of education which they label ISLED, the International Standard Level of Education, based on the optimal scaling of the country-specific education

variables for ESS (R1-4). In this article, we apply the ISLED scaling methodology to the ESS-R5 data, but with two important modifications. First, we scale not only the country-specific education variable, but also the four harmonizations that are found in the ESS. This makes it possible to estimate the exact amount of information that is lost with various degrees of aggregation. Second, we scale these variables not only for the respondent, but also for the other persons in the status attainment model, namely respondent's partner, father and mother (ESS-R5 is the first round that contains all the necessary variables). This procedure allows us to determine the cumulative effect when the qualification indicators have been measured with the same variable for all persons.

Apart from optimal scaling, Schröder & Ganzeboom (2014) propose another method to improve measurement quality, namely double indicator latent variable modelling. This method requires asking two independent questions on education level, as has been implemented in the ESS, but only for the respondent. In this procedure, the two resulting measures are combined in a latent variable measurement model, which allows for the full correction of random measurement error. Here we apply this method to the ESS-R5 data and estimate the additional effect of latent variable modelling, over and above the maximization of single indicator measurement quality. Our results reveal how much can be gained or lost in terms of structural coefficients and explained variance.

We would like to emphasize at this point that we regard the introduction in ESS-R5 of a detailed harmonized qualification variable (EDULVLb), which is based on UNESCO's most recent version of the International Standard Classification of Education, ISCED-2011, as a major achievement. While previous ISCED-based harmonizations remained coarse in only reflecting the first digit of the classification, the new ESS-variable exploits all three ISCED-2011 digits. ESS-R5 is the first survey to do this and given that ISCED-2011 covers all countries, we trust that this new variable has the potential of generating a detailed and truly standard international education measure.

To sum up, with this article we pursue the following five goals. First, we present a concise documentation of the system of comparative measurement of education in ESS for all five rounds, mainly as a service to ESS users. Second, we explain the nature of the new ISCED-2011, which was introduced as a harmonization tool in ESS-R5. Third, we provide optimal scale scores for all ESS qualification variables. Fourth, we present empirical evidence on the measurement quality

of the various ESS education measures and assess their respective cumulative effect on structural coefficients in an intergenerational status attainment model. Fifth, applying latent variable modelling, we demonstrate that in terms of measurement quality this approach outperforms even the best single indicator.

3.2 Four approaches to achieve cross-national comparability of education level in survey research [19]

In survey research there are two widely used conventional methods to make education levels comparable, both of which have merits as well as drawbacks: harmonization and duration. A third, arguably undeservedly, less commonly used method is scaling. A fourth way to achieve cross-national comparability, finally, is latent variable modelling, a tool from classic measurement theory, proposed by Schröder & Ganzeboom (2013). In the following, we briefly discuss all four methods, each of which we will assess and integrate in our analyses.

Harmonization

The idea behind harmonization is that different national education systems can be made comparable by looking for equivalent elements. Taking country-specific classifications as a vantage point, harmonization attempts to reduce the complexity of these classifications to those elements all classifications have in common. This is also known as the largest common-denominator approach. The problems with this approach are easy to anticipate. To begin with, it leads to a loss of information as any common denominator by definition contains fewer categories than its source classification. For some categories, moreover, it is simply not possible to find a common denominator and incomparabilities can at best be solved by compromise. Logically, such harmonization problems grow with the number of source classifications that need to be harmonized.

Many common denominator approaches in comparative surveys use some adaptation of the International Standard Classification of Education: ISCED-76 or ISCED-97 (UNESCO, 1976, 2006; OECD, 2011). While ISCED is a very useful and valuable classification, its actual application in surveys is problematic because here ISCED tends to be reduced to its bare bones, with only the seven (or even fewer) distinctions of its first digit being exploited, leaving the many subsidiary criteria aside. Examples of surveys that have applied such one-digit versions of ISCED are PISA (Program for International Student Assessment), IALS

19 The discussion in this paragraph closely follows the arguments of Schröder & Ganzeboom (2013).

(International Adult Literacy Survey) and ESS-R1-4. Research assessing such implementations of ISCED in surveys (Kerckhoff & Dylan, 1999; Schneider, 2009) has identified a number of problems and concludes that the categories contain insufficient differentiation for some levels and that the way country-specific classifications are recoded into the standard categories can cause strong bias in comparative research.

As ESS-R5 demonstrates, however, it is feasible to implement a three-digit ISCED variable [20]. Our research will show that the introduction of such a three-digit variable is very promising. Using ISCED's second digit makes it possible to take the distinction between general and vocational education into account, a distinction that is crucial in the German and other European education systems. This distinction was central to the CASMIN (Comparative Analysis of Social Mobility in Industrial Nations) classification, which was developed by Müller et al. (1988) in the 1980's as an alternative to ISCED. The two new ESS-harmonizations incorporate this distinction, countering the arguably most important criticism on previous versions of ISCED. Using the third digit, finally, makes it possible to take into account what kind of further education a given programme grants access to and whether or not the level was completed. As we will demonstrate below, the incorporation of these distinctions noticeably improves measurement quality.

Duration

Another widely used method to make education level comparable is the use of duration measures. Duration measures are based on the assumption that the length of an educational career by-and-large increases with the level of education. Examples of surveys using duration measures are again the IALS and the ESS, as well as in the International Social Survey Programme [ISSP]. The questions included in these surveys refer to either the school-leaving age or the number of years spent in education.

Using duration as the basis for the measurement of education level has a number of advantages and avoids some of the hazards posed by harmonization. First, duration measures are continuous and have an unproblematic metric, which makes them directly comparable without any need of recoding. This is why Schröder & Ganzeboom (2014) use duration as a cross-national metric to calibrate ISLED scores, which would otherwise not be comparable across countries. Second, duration questions are simple and are much less subject to

20 EVS-R4 has also implemented a 3-digit variable, but based on the 1997 version of ISCED, while ESS-R5 implements the brand-new ISCED-2011.

revisions, at least in the ESS. Third, duration can be used as second indicator in latent variable models. Fourth, duration has a clear theoretical interpretation based on human capital theory (Becker, 1964): duration directly measures the period of foregone earnings that people use for investment into future earnings.

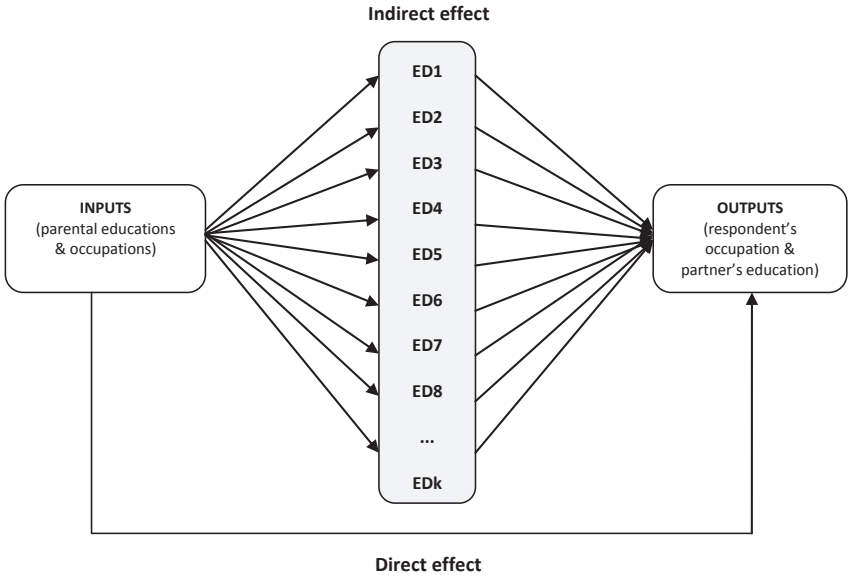
While duration measures may have good comparative qualities, they have relatively poor measurement quality, primarily because they contain a relatively large amount of random error (Schneider, 2010; Schröder & Ganzeboom, 2014). Asking respondents how much time they have spent at school usually involves some arithmetic that depending upon the education system poses some level of difficulty. The question formulations used are often complicated and fail to unequivocally define what exactly is to be counted (e.g. part-time education or vocational training) or when exactly the counting is to start or end (e.g. pre-school education or courses taken in later life). Hout & DiPrete (2006), finally, argue that this method only works reasonably well for undifferentiated education systems like that of the United States but is much less suited to capture the distinctions of the more differentiated education systems we tend to find in Europe. Duration measures presuppose a strictly hierarchically ordered education system.

Scaling

A third strategy to obtain comparability is via common scaling. Scaling means that score values are assigned to education categories. Scale scores can for example be based on the number of years officially required to reach a given level within the institutionalized education system. Such information is provided in the *Education at a Glance* publications of OECD (2011) and in the ISCED manual (OECD, 2006). An application of this type of scaling can be found in the International Stratification and Mobility File (Ganzeboom & Treiman, 2012), which contains a variable that converts local categories into 'pseudo' (or institutional) years of education. Hoffmeyer-Zlotnik & Warner (2007) use a similar method and allocate the education categories of four countries to 10 different levels, resulting in an ordinal hierarchy.

Rather than relying upon such ad-hoc criteria for scaling procedures, scale scores can also be derived empirically. Empirical procedures usually optimize the association of education categories with pertinent criterion variables. Suitable criterion variables can either be input or output variables. In so-called *effect-proportional* scaling, scale scores for education categories are generated by maximizing the correlation between an education variable and an output variable, typically occupation or income. An example is the approach chosen

Figure 3.1: Measuring education levels: an optimal scaling procedure



Note: ED1, ED2 etc. are the respective categories within an educational classification

by Treiman & Terrell (1975) who, in a comparison of the US and UK education systems derive education scores using the occupational status of the respondent as criterion variable.

If scaling relates to input variables, it is no longer proportional to an effect but rather to a cause. Such type of scaling is therefore aptly labelled as *cause-proportional* scaling. The only example of cause-proportional scaling we are aware of can be found in Smith & Garnier (1987), who generate an education scale using father's occupation as criterion variable. Like the respondent's occupation, father's occupation strongly correlates with education level.

Schröder & Ganzeboom (2014) propose *cause-and-effect-proportional* scaling, an optimal scaling approach that integrates causes and effects of education in one unified model. Their model for the construction of optimal scale scores is shown in Figure 3.1. In this model, which is grounded in the status attainment tradition (Blau & Duncan, 1967), discrete education categories are interpreted as intervening between multiple input and multiple output variables. The optimal scaling algorithm Schröder & Ganzeboom used is based upon the algorithm developed to generate ISEI status scores for detailed occupations (Ganzeboom, De Graaf & Treiman, 1992). These authors argue that occupation status must be conceptualized as the intervening mechanism between education and

income. A scaling of occupation is optimal, if the indirect effect of education on income via occupation is at a maximum, and the direct effect is at a minimum. Similarly, Schröder & Ganzeboom (2014) conceive of education as a mediating variable that converts parental resources into market outcomes. Education categories are optimally scaled if the direct effect of parental status (father's and mother's education and occupation) on offspring's outcomes in later life (occupational status and education level of the spouse) are minimal and hence the indirect effects are maximal. The algorithm is basically the same as in the ISEI construction, but extended to multiple inputs and multiple outputs.

Like the other methods, scaling has not remained without criticism. Braun & Müller (1997) for example argue that effect-proportional scaling relies on the assumption that the country-specific education measures have identical associations with the criterion variable in all contexts, thus transferring the problem of comparability from the education to the criterion variable. The latter ought to be measured in a strictly comparable way, they argue, which is rarely the case. Schröder & Ganzeboom (2014) deny the validity of this argument because even if the criterion variables are poorly measured, this will leave the ordering and relative distances of the education categories unaffected.

Latent variable modelling

While it is standard practice to use several indicators in the measurement of social attitudes, studies in which social background variables are measured with more than one indicator are rare. De Vries & de Graaf (2008) provide an overview of such studies and distinguish between different research designs. A first design is the *multiple moment* design, in which respondents are asked the same question at different points in time. An example is Allison & Hauser (1991) who obtain second measures from a repeated observation of a small random subsample. A second design is the *multiple source types* design, where another source, for example register data, is used to obtain a second measurement. Hauser & Massagli (1983), for example, used tax records to derive a second measure for father's occupation. A third design is the *multiple informant* design, where more than one person is asked about family background variables. This design was used by De Vries & de Graaf themselves, who used data in which not only the respondents but also their siblings and parents provide information on parental educations and occupations.

Schröder & Ganzeboom (2014) used what may be labelled a *multiple (or: alternate) question* design. Here respondents are asked two alternative

independent questions on their own education. This design has the advantage of single person reporting, with no other costly data, respondents or repeated measurement needed. The use of double indicators, however, is not just a matter of data collection, but can be extended to modelling, as both indicators may be joined in a latent variable measurement model. The advantage of latent variable modelling is that it identifies the common information contained in each indicator, while at the same time making it possible to identify and correct the unique measurement error [21] in each indicator. All information is thus maximally exploited and as a result the measurement quality improves over and above that achieved by using even the best single indicator.

3.3 The International Standard Classification of Education [ISCED]

A natural vantage point for any account of the comparative measurement of education level is the International Standard Classification of Education [ISCED]. ISCED, developed and maintained by UNESCO, organizes country-specific information on education. It was first designed in the early 1970s as ISCED-76 to serve "as an instrument suitable for assembling, compiling and presenting statistics of education both within individual countries and internationally" (UNESCO, 1997[2006]: pp. iii). The instrument has since been revised and upgraded, and most datasets use the ISCED-97 version. ISCED-97 primarily crosses two dimensions: *levels* and *fields* of education. These two main dimensions are complemented with a number of subsidiary criteria, such as the typical entrance qualification, minimum entrance requirement, minimum age and staff qualification. Extensive mappings are available for ISCED-97, for all countries covered, providing guidelines on how to classify a given programme in existence in 1997 (e.g. OECD, 1999). However, fields of education (such as health, computing, etc.) play no role in survey implementations of ISCED.

Recently, in 2011, a new upgraded version of ISCED was introduced. ISCED-2011 differs in three main aspects from ISCED-97 (UNSD, 2011). First, it distinguishes nine rather than seven main levels (first digit), differentiating in particular the first stage of tertiary education into Bachelor, Master and Short Cycle tertiary education. Second, the programme orientation has been simplified and now distinguishes only two categories, general and vocational (second digit). Third, more detail is available on formal and non-formal education (third digit). The

21 If only one education is measured with double indicators, this is limited to random measurement error. If double measurement is also applied to another education, in particular of another person, latent variable models may also identify an important form of systematic (correlated) measurement error. See Chapter 4.

new three-digit structure of ISCED-2011 makes it possible to implement a much more detailed version of ISCED in survey research. To our knowledge, ESS-R5 is the first survey to do so and we will bring to light the benefits and potential of this approach in this article.

3.4 The ESS education measures

The ESS questionnaires in all rounds contain two different and independent questions on respondent's education, one on the total time spent in education (duration) and one on the highest level obtained (qualification). The duration question is identical for all countries, while the qualification question is country-specific, providing national education classifications as answer formats. From these two questions, ESS derives as many as six different education variables. The first is a duration measure, the second is the country-specific variable and the remaining four are various harmonizations of the country-specific variable.

The duration measure

The first independent measurement of education level in the ESS data is a duration question. The question is the same for all countries and concerns the length of people's education careers. The precise wording of the question is: "About how many years of education have you completed, whether full-time or part-time? Please report these in full-time equivalents and include compulsory years of schooling". The resulting variable EDUYRS has the advantage of being easy to use for statistical analyses and of not having changed across ESS rounds in any country at all. Unfortunately, this question is only asked about the respondent's education.

The country-specific variable

The second measurement of education is a qualification question. It is represented in country-specific variables, labelled EDLVa/b/c/dXX, where XX represents the ISO country acronyms and a/b/c/d mark changes over rounds, is the variable that directly reflects the original qualification question in the questionnaire. The exact question wording differs between countries. Examples are: "Which is the highest level of education that you achieved" (France, Netherlands), "Have you passed any of the examinations on this card? Please choose the section into which your HIGHEST level of education falls" (Great Britain). While for ESS-R1-3 this country-specific format of this question was limited to the respondent, from R4 onwards the country-specific format was also introduced for the partner

and parents. In R5 all country-specific variables changed, because it was made mandatory to start formulating the question using ISCED-2011 as a basis. The new country-specific variables are called EDLVdXX. Virtually all the new variables contain more detail than their predecessors, now ranging from 10 to 27 categories. Appendix 3A provides an overview of these variables along with the number of categories they contain per country and per round.

The harmonized variables

In order to make the country-specific qualification variables fit for cross-national analysis, they need to be harmonized. The ESS harmonization process is rather complex and yields four harmonized variables to the analyst: EDULVL, EDULVLa, EISCED and EDULVLb. We will introduce them one by one.

Before the major revision in 2011, the country-specific variables were post-coded into a seven-category ISCED-based variable, named EDULVL. Due to misclassifications, the comparability of this harmonization was judged to be insufficient (Schneider, 2009) and the variable was removed from the dataset. In the revised R1-4 datasets it was replaced by EDULVLa, a corrected and compressed (five categories) version of EDULVL, where the first two categories, 'less than primary' and 'primary', as well as the last two, 'tertiary' and 'post-tertiary', have been merged. Note that EDULVLa is not directly available in the ESS-R5 data, but easy to derive [22].

As of R5, EDULVL/EDULVLa is replaced by two new harmonizations, EDULVLb and EISCED. EDULVLb is a particularly detailed harmonized variable, consisting of a three-digit hierarchical coding framework, which is based on (but is not identical to) ISCED-2011 (cf. Table 3.1, first two columns). The first digits of EDULVLb and ISCED-2011 are identical and refer to the nine main ISCED-2011 levels [23]. The second digits, which mark the difference between general and vocational programme orientation, correspond one-to-one to ISCED-2011, but numbering in the ESS deviates from the ISCED numbering system. For levels 2-4 a third digit is used to distinguish which follow-up courses programmes give access to. In this third digit, the ESS-R5 variable EDULVLb makes distinctions that are lacking in

22 From EDULVLb, see below.

23 There is one exception to this rule, namely EDULVLb category 129, which in our understanding had better be classified as 219, being an unfinished type of lower secondary vocational education. Its ISLED score, which is ten points above that of primary education (see Table 3.1, column 3), confirms the idea that this category is misclassified at ISCED level 1. If this were corrected, ESS would contain only be one category for completed primary education, just like in ISCED-2011.

ISCED-2011, namely whether programmes give access to higher level education or exclusively to vocational programmes.

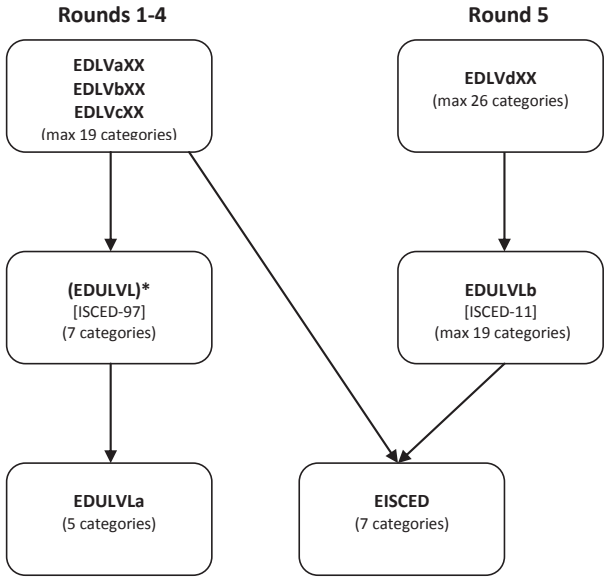
The ESS (2013) documentation provides bridging specifications for all participating countries on how to code EDULVLb from the country-specific source variable. In theory EDULVLb provides 27 codes. These 27 codes are, however, exploited to varying degrees in different countries. With 19 effective categories the Swiss EDULVLb variable is most detailed, while the Russian variable, which has 10 categories, is least detailed. The remaining countries rank somewhere in between. It is important to note that with an average of just over 14 categories, EDULVLb is only slightly less detailed than EDLVdXX, which on average contains just over 15 categories. Our Appendix 3B contrasts the number of categories in the country-specific source variables with that in EDULVLb.

Finally, EISCED is a new seven-category harmonized variable derived from EDULVLb. It is the result of a lengthy consultation process ESS engaged in with Silke Schneider, who proposed this harmonization (Schneider, 2009). EISCED departs from the rationale used with the other harmonized variables in the ESS in as much as its categories do NOT correspond to either ISCED-97 or ISCED-2011 (Table 3.1). EISCED closely corresponds to the first digit of EDULVLb, but is not identical. First digit 0 and 1 in EDULVLb, as well as 219, become EISCED 1. Except for 219, all 200-categories in EDULVLb correspond to EISCED level 2. But then half of the 300-categories become EISCED level 3, the other half level 4. EISCED 5 combines all 400 and 500 categories. 600-categories fall into EISCED 6 and 7- and 800-categories, finally, become EISCED 7. While the data files of R1-4 contain EDULVLa and the R5 file EDULVLb, EISCED is available for all rounds, but for a limited number of countries.

Figure 3.2 illustrates how the harmonized variables are derived and how they are linked to each other. It must be emphasized at this point that while all these variables are somehow related to the ISCED classification, they do not all follow it precisely. While EDULVL/EDULVLa mirrors the first digit division of ISCED-97 and EDULVLb the first digit of ISCED-2011, EISCED does neither but rather merges different categories [24]. Table 3.1 provides an overview of the categories of the respective harmonized variables and how they are related to the two versions

24 Given that EISCED has the same number of categories as the former EDULVL and that the first digit of EDULVLb is identical to that of ISCED-2011, we would argue that the naming of these variables should have been the other way around: EDULVLb should have been labeled EISCED, a European variant as it were of ISCED-2011, while EISCED is a successor of EDULVL and would more appropriately be called EDULVLb.

Figure 3.2: Harmonization of the country-specific variables in the ESS



Note: (*no longer directly available in data)
EDLVa//b/c/dXX=country-specific ESS education variables, with a/d/c/d designating a change in the variable
EDULVL=ESS common denominator variable based on ISCED-97
EDULVLa=compressed ESS common denominator variable based on ISCED-97
EDULVLb=new detailed ESS common denominator variable based on ISCED-2011

of the ISCED classification. It also illustrates how they can be coded into one another: while EISCED, EDULVL and EDULVLa can all be derived from EDULVLb, it is not possible to recode EISCED into EDULVL/EDULVLa or vice versa. Appendix C shows the availability of EISCED per round and country.

Appendix 3D summarizes which ESS education measure is available for which round and for which person. In contrast to previous rounds, from ESS-R5 onwards all variables, except for EDUYRS, are available not only for the respondent, but also for partner and both parents. This is a major improvement, because in R1-4 EDULVLa was the only measure available for parents and partner.

3.5 Data and method

Data

We use the ESS data from R5, which include 26 countries: Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Great Britain, Hungary, Ireland, Israel, Netherlands, Norway, Poland, Portugal, the Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland and the Ukraine [25]. The overall number of respondents is 50,781. Excluding students and people under 18 years of age, who have not yet completed their education and are less likely not have acquired an occupation or partner yet, as well as people over 74 we obtain an effective sample size of 41,264.

The ESS-R5 data are for three reasons particularly well suited to evaluate the advantages and disadvantages of each method of comparative measurement of education level. First, in R5 ESS has revised its country-specific qualification measures, which are now much more detailed. Second, ESS-R5 has introduced a novel likewise much more detailed harmonized variable based on ISCED-2011, together with other more crude common denominator harmonizations. Third, for ESS-R5 the new detailed country-specific measures are not only available for the respondent, but also for partner and parents, which enables us to match all qualification measures in our models.

Generating optimal scale scores

We apply the optimal scaling procedure introduced by Schröder & Ganzeboom (2014) to the five ESS qualification variables consecutively. The algorithm to find the optimal scaling of education levels is a variation of the algorithm used for the development of the ISEI index (Ganzeboom, de Graaf & Treiman, 1992), where occupational status was defined and calculated as the scaling of occupational categories that mediates best the influence of education on income. Schröder & Ganzeboom's procedure scales education categories in a status attainment model such that the indirect effects of inputs (parental educations and occupations) on outputs (respondent's occupation and education level of the partner) which run via education level are maximized, while the direct effects of inputs on outputs are minimized (Figure 3.1).

25 We did not include Lithuania, which was a later addition to the R5 data.

We scale all qualification variables contained in the ESS-R5 data: the country-specific variables EDLVdXX and the two newly designed harmonized variables EDULVLb and EISCED. Since one of the aims of this study is to assess the improvement these new variables bring about, we furthermore scale the old-style harmonized variables EDULVL and EDULVLa, which we have reconstructed by means of a recode of EDULVLb. We have first recoded EDULVLb into EDULVL (the first digit of ISCED-97) and then merged the first and the last two categories of EDULVL in order to obtain EDULVLa.

The constructed optimal scale scores are Z-standardized across countries for the harmonized variables and both across and within countries for the country-specific variable. The standardized country-specific score-values are comparable within but not between countries. A similar qualification may obtain different scores in different countries, depending upon the country-specific association with the criterion variables. The within-country standardized metric is sufficient when doing analyses on a country-by-country basis, but will not allow the analyst to control for education level between countries, nor to compare means and dispersions between countries. For this, a common metric needs to be assigned to the score values. In order to produce a common metric, we replicate the procedure introduced by Schröder & Ganzeboom (2014) to produce ISLED scores, the International Standard Level of Education. We calibrate the optimal scores on the duration variable EDUYRS. This calibration consists of two steps. First, we equalize the mean and dispersion between the optimal scale and the duration measure in over-all standardized Z-terms. This produces five sets of ISLED scores, one for the country specific variable and four for its respective harmonizations. Second, we project back into a 0…100 metric by means of an anti-logistic transformation:

$$ISLED=100*(\exp(Z)/(1+\exp(Z))$$

The mean and dispersion of these ISLED distributions are proportional to that of duration, making ISLED scores directly comparable between countries.

Validation

We then analyze the data in two steps. In step 1 we model the various indicators in a latent variable model which yields measurement coefficients and in step 2 we examine the structural coefficients in a status attainment model.

Table 3.1: Steps in the derivation of the four harmonized ESS education variables (EDULVLb, EISCED, EDULVL & EDULVLa), their relation to ISCED and their respective ISLED scores

ISCED-11	EDULVLb (and how it is related to ISCED-97)		ISLED	EISCED		ISLED	EDULVL (=1st digit ISCED-97)		ISLED	EDULVLa		ISLED
0	0	Not completed ISCED level	17.3	1	ES-ISCED I, less than lower secondary	19.0	0	Less than primary	17.3	1	Primary or less	19.0
100	113	ISCED 1: completed primary education	19.3				1	Primary	19.3			
252	129	ISCED 2C: < 2 years vocational - no access ISCED 3	29.9				2	Lower Secondary	30.6	2	Lower Secondary	30.6
243	212	ISCED 2A/2B: general/pre- vocational - access ISCED 3	30.3	2	ES-ISCED II, lower secondary	31.1						
244	213	ISCED 2A: general - access ISCED 3A general/all 3	30.5									
253	221	ISCED 2C: >=2 years vocational - no access ISCED 3	25.4									
	222	ISCED 2A/2B: vocational - access ISCED 3 vocational	33.7									
252	229	ISCED 3C: < 2 years vocational - no access ISCED 5	34.0				3	Upper Secondary	44.9	3	Upper Secondary	44.9
342	311	ISCED 3: >=2 years general - no access ISCED 5	39.9	3	ES-ISCED IIIb, lower tier upper secondary	41.5						
353	321	ISCED 3C: >= 2 years vocational - no access ISCED 5	57.6									
	322	ISCED 3A/3B: vocational - access 5B/lower tier 5A	48.8									
343	312	ISCED 3A/3B: general - access ISCED 5B/lower tier 5A	40.4	4	ES-ISCED IIIa, upper tier upper secondary	48.5						
344	313	ISCED 3A: general 3A - access upper tier ISCED 5A/all 5	44.0									
354	323	ISCED 3A: vocational 3A - access upper tier ISCED 5A/all 5	48.1									
443	412	ISCED 4A/4B: general - access ISCED 5B/lower tier 5A	56.6	5	ES-ISCED IV, advanced vocational, sub-degree	56.4	4	Post-secondary	53.4	4	Post-secondary	53.4
444	413	ISCED 4A: general - access upper tier ISCED5A/all 5	51.8									
453	421	ISCED 4: programmes without access ISCED 5	48.2									
	422	ISCED 4A/4B: vocational - access ISCED5B/lower tier 5A	57.7									
454	423	ISCED 4A: vocational - access upper tier ISCED5A/all 5	55.4									
540	510	ISCED 5A: short, intermediate/academic/general tertiary below	69.6				5	Tertiary	73.2	5	Tertiary and post-tertiary	73.6
550	520	ISCED 5B: short, advanced vocational qualifications	57.4									
640	610	ISCED 5A: medium, bachelor/equivalent from lower tier tertiary	70.4	6	ES-ISCED V1, lower tertiary education, BA	74.2						
650	620	ISCED 5A: medium, bachelor/equivalent from upper/single tier	78.0									
740	710	ISCED 5A: long, master/equivalent from lower tier tertiary	78.4	7	ES-ISCED V2, higher tertiary education, >= MA level	83.2						
750	720	ISCED 5A: long, master/equivalent from upper/single tier tertiary	83.3									
800	800	ISCED 6: doctoral degree	90.4				6	Post-Tertiary	90.4			

Note: While EDULVLb corresponds to the (first digit of) ISCED-2011, EISCED does not
EDULVL and EDLUVLa correspond to the first digit of ISCED-97
ISLED: scale scores per category, valid across countries

Step 1: Estimating measurement coefficients

In the first part of our analysis we compare the quality of the five scaled qualification measures and the duration measure, applying a Full Information Maximum Likelihood (FIML) Simultaneous Equation Model (SEM) in Lisrel 8.8 (Jöreskog & Sörbom, 1996), alternating the newly derived optimally scaled variables as a first indicator in a latent variable measurement model, while always keeping duration in as the second indicator. We run five models in which we combine EDUYRS with one of the qualification measures (the country-specific variable EDLVdXX and the harmonized variables EDULVLb, EISCED, EDULVL, and EDULVLa), respectively.

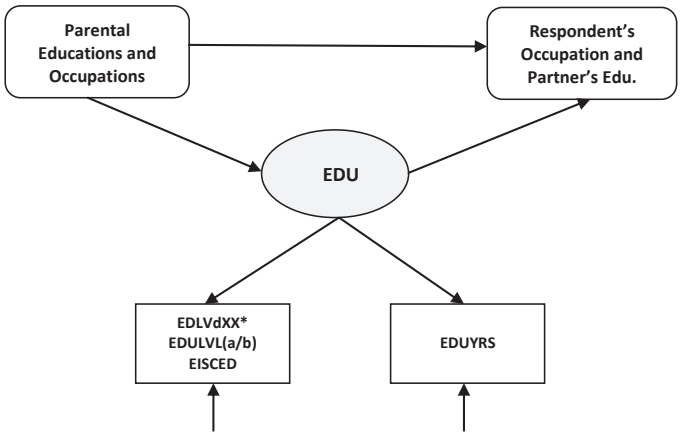
The measurement coefficients (factor loadings) in the model are inversely related to the amount of error contained in each measure and provide a direct indication of the amount of information that is lost. If a measure were perfect, its measurement coefficient would be 1. The difference to 1 signifies the loss of information, which may be expressed in percentage points. Since we apply the exact same scaling procedure to all qualification measures, the comparison reveals the net effect of each harmonization step. From most to least detailed the rank order of the variables is as follows: country-specific variables EDLVXX (most detailed), followed by EDULVLb, EISCED / EDULVL and EDULVLa (least detailed).

Figure 3.3 depicts the indirect effects SEM model. The model consists of two parts, a measurement and a structural part. As is customary in SEM models latent variables are represented by ovals and measured variables by rectangles. The measurement model illustrates how the latent education variable is measured with two indicators, EDUYRS, and one of the respective scaled qualification variables.

Step 2: Estimating structural coefficients

In the second step of our analysis we estimate seven status attainment models, which differ only in how education level is measured. In the first five models we alternate the education measures for all persons in the model, using one of the five scaled ESS qualification measures respectively. In the next two models we contrast the worst possible model, in which we use the weakest indicators (EDUYRS for the respondent and EDULVLa for partner and parents), with the best possible model in which we apply latent variable modelling for respondent's education and use the strongest indicators (ISLED based on EDLVdXX), for the other persons in the model.

Figure 3.3: Modelling level of education: a latent variable indirect effects model



Note: *country-specific measure
EDUYRS=ESS duration measure of education; ESS common denominator harmonizations: EDLVdXX: based on ISCED-2011, 26-categories; EDULVL: 7 categories and EDULVLa: 5 categories, both based on ISCED-2011; EISCED: based on ISCED-2011, 7 categories
The duration measure is the first indicator in all models, while the second indicator, is one of the respective qualification indicators: per model one of the various harmonizations is used

3.6 Results

Table 3.1 (cf above) displays the ISLED values of the harmonized qualification variables, starting with the most detailed EDULVLb on the left, followed by EISCED, EDULVL and EDULVLa. Because these variables are harmonized, the score values are identical for all countries. At each higher level of aggregation, the score values are the weighted averages of the categories that they combine. Subsequently we compare the quality of the various indicators in latent variable measurement models. Table 3.2 provides an overview of the measurement coefficients for each indicator per country. Columns 1-5 display the measurement coefficients for the various (ISLED-scaled) qualification variables per country, while column 6 shows the measurement coefficients for the duration variable. The cross-country averages (XNAT) reveal that the country-specific variable EDLVdXX (column 1) performs best. This is logical because this indicator does not involve any harmonization and therefore no information is lost [26].

26 One would expect that the variation in these measurement coefficients is related to number of categories in the country-specific variable. Surprisingly, however, there appears to be no such link: the correlation between the measurement coefficients in Table 3.2, column 1, and the number of categories distinguished per country (Appendix 3B) is almost 0. What seems to be more important instead is how well the individual categories distinguished in the variable represent the respective national education system.

Table 3.2: Measurement coefficients (factor loadings) of ESS R5 education measures (N=41,264)

ISO	Country	Education measure					
		1	2	3	4	5	6
		EDLVdXX	EDULVLb	EISCED	EDULVL	EDULVLa	EDUYRS
XNAT		**0.960**	**0.953**	**0.947**	**0.907**	**0.902**	**0.866**
BE	**Belgium**	0.967	0.960	0.947	0.927	0.923	0.781
BG	**Bulgaria**	0.983	0.978	0.975	0.956	0.955	0.965
CH	**Switzerland**	0.950	0.929	0.918	0.818	0.796	0.780
CY	**Cyprus**	0.993	0.992	0.990	0.959	0.957	0.879
CZ	**Czech Republic**	0.967	0.971	0.957	0.893	0.896	0.882
DE	**Germany**	0.938	0.899	0.885	0.835	0.821	0.803
DK	**Denmark**	0.902	0.922	0.906	0.870	0.863	0.707
EE	**Estonia**	0.919	0.917	0.916	0.909	0.907	0.867
ES	**Spain**	0.978	0.959	0.954	0.952	0.945	0.908
FI	**Finland**	0.952	0.938	0.933	0.885	0.882	0.896
FR	**France**	0.961	0.944	0.938	0.889	0.886	0.827
UK*	**United Kingdom**	0.911	0.914	0.911	0.903	0.901	0.770
GR	**Greece**	0.980	0.986	0.986	0.980	0.977	0.937
HR	**Croatia**	0.957	0.944	0.942	0.917	0.919	0.890
HU	**Hungary**	0.983	0.983	0.977	0.941	0.939	0.882
IE	**Ireland**	0.959	0.946	0.940	0.931	0.924	0.868
IL	**Israel**	0.975	0.978	0.974	0.946	0.939	0.912
NL	**Netherlands**	0.940	0.912	0.901	0.880	0.877	0.777
NO	**Norway**	0.961	0.953	0.941	0.910	0.901	0.839
PL	**Poland**	0.990	0.965	0.965	0.939	0.937	0.909
PT	**Portugal**	0.976	0.967	0.965	0.965	0.962	0.944
RU	**Romania**	0.943	0.954	0.952	0.782	0.777	0.909
SE	**Sweden**	0.959	0.968	0.952	0.923	0.908	0.895
SI	**Slovenia**	0.978	0.975	0.970	0.927	0.925	0.885
SK	**Slovakia**	0.975	0.957	0.953	0.914	0.915	0.804
UA	**Ukraine**	0.983	0.969	0.961	0.886	0.880	0.903
SD		**0.024**	**0.025**	**0.027**	**0.056**	**0.050**	**0.063**

Note: XX = cross-country averages
*In the ESS data for the UK GB was used as ISO-code, which is incorrect

The remaining four qualification variables are all optimally scaled common-denominator harmonizations. Harmonization introduces aggregation error and this will affect measurement quality, albeit to varying degrees. Generally speaking, we find that measurement quality decreases with the degree of aggregation (=reduction of categories). This again is logical because fewer categories equal greater loss of information. Columns 2-5 of Table 3.2 illustrate this and show EDULVLb (column 2) to be the second best qualification indicator, followed by EISCED (column 3) , EDULVL (column 4) and EDULVLa (column 4).

Column 6 in Table 3.2 shows the duration measure EDUYRS, with an average measurement coefficient of 0.866, to be the weakest indicator. This measurement coefficient implies that when used in statistical analyses EDUYRS attenuates results by 13.4%. The attenuation, however, varies greatly across countries, ranging from as much as 21.9% for Belgium to as little as 3.5% for Bulgaria. In other words, while EDUYRS is a perfectly adequate indicator for some countries, it severely attenuates results in others.

	Measurement coefficient	Attenuation
EDLVdXX	0.960	4.0%
EDULVLb	0.953	4.7%
EISCED	0.947	5.3%
EDULVL	0.907	9.3%
EDULVLa	0.902	9.8%
EDUYRS	0.866	13.4%

While these results are in line with our expectations, it must be acknowledged that the greatest drop in quality occurs when moving from EISCED to EDULVL, which have the same number of categories. Here, rather than a reduction in categories, it is the difference in bridging that appears to make the difference. In other words, while for the construction of both variables the number of categories is drastically reduced, the respective country-specific education categories are much better preserved in EISCED than in EDULVL. By the same token, despite their considerable difference in detail, the move from the 10-19 categories of EDULVLb to 7 categories in EISCED leads just to a minor deterioration.

Surprisingly, it does not seem to hold that more categories in EDULVLb yield higher measurement coefficients. Rather, the quality of EDULVLb appears to be dependent on the measurement quality of the underlying country-specific source variable: the correlation between the measurement coefficients in columns 1 and 2 equals 0.85. This strong correlation indicates that EDULVLb, which is by far the most detailed harmonized variable, comes very close in measurement quality to the country-specific measure. The number of categories, however, is not the only factor determining the quality of the harmonization. Compared to EDULVLb, EISCED performs only 0.6% worse.

All the scaled qualification variables, including the poorest (EDULVLa), perform better than the duration variable EDUYRS. The loss of information varies between

4% and 9.8%, which is all much less than that found for EDUYRS, which incurs a loss of 13.8%. EDUYRS is also the variable which is least consistent across countries, as is indicated by the large standard deviation of the distribution of measurement coefficients. With 0.063 this is almost double that of EDLVdXX, the best measure which has a standard deviation of 0.024. As the last row of Table 3.2 indicates, the standard deviation of the distribution of measurement coefficients appears to be increasing with decreasing measurement quality.

Finally, we estimate seven different status attainment models. The first five, shown in Table 3.3, alternate the five different qualification variables as single indicators of education level. Since for ESS-R5 we have all these indicators not only for the respondent but also for partner and both parents, we can assess the overall performance of the respective indicators by consistently using the same type of indicator for all education variables in the model. Their measurement quality directly affects effect sizes and explained variances in the dependent variables. As predicted by their measurement coefficients, we observe that the better the indicator, the smaller the direct effects, the larger the indirect effects and the greater the explained variance. Unsurprisingly, the country-specific variable EDLVdXX (model 1) excels as the best measure. It produces the largest indirect effects (cf. effects of parental occupations on respondent education and the effect of respondent's education on occupation and education of the partner) and smallest direct effects (cf. effects of parental educations and occupations on respondent's occupation and education of the partner), accordingly explaining the largest proportion of variance in all three dependent variables (respondent's education and occupation and partner's education).

If we instead use EDULVLb (model 2) the explained variance is on average reduced by 1.3%, and if we use EISCED (model 3) it is reduced by another 0.6%. Again we observe the greatest relative deterioration by moving from EISCED (model 3) to EDULVL (model 4). Here the explained variance decreases by an average of 3.4%, whereas we only lose another 0.5 % of the variance by moving from EDULVL to EDULVLa (model 5). Nonetheless, EDULVLa remains the weakest indicator. In line with our expectations it produces the largest direct and the smallest indirect effects as well as the smallest percentage of explained variances in all three dependent variables.

To bring out how dramatic the consequences of the choice of an education indicator can be, in Table 3.4 we contrast the worst with the best possible model. In the worst model (1), respondent's education is measured with the duration measure EDUYRS, while the education of partner and parents is measured with

Table 3.3: Model parameters for ALL COUNTRIES ESS R5 (N=41,264): single indicator models: education measured with the same qualification measures for respondent, partner, father and mother respectively

	Indicator				
	1	2	3	4	5
	EDLVdXX	EDULVLb	EISCED	EDULVL	EDULVLa
STRUCTURAL MODELS					
INDEPENDENT VARIABLES	**DEPENDENT VARIABLES**				
(1) Respondent's education					
Father's Education	0.204	0.210	0.205	0.196	0.192
Mother's Education	0.158	0.154	0.151	0.145	0.140
Father's Occupation	0.147	0.130	0.135	0.122	0.124
Mother's Occupation	0.115	0.107	0.106	0.102	0.105
R^2	**0.274**	**0.255**	**0.249**	**0.221**	**0.217**
(2) Partner's education					
Parents' Education	0.100	0.108	0.108	0.113	0.113
Respondent's Education	0.510	0.495	0.491	0.454	0.453
R^2	**0.387**	**0.378**	**0.371**	**0.332**	**0.328**
(3) Respondent's occupation					
Parents' Occupation	0.048	0.064	0.067	0.087	0.091
Respondent's Education	0.595	0.573	0.564	0.516	0.510
R^2	**0.409**	**0.397**	**0.391**	**0.357**	**0.352**
FIT STATISTICS					
RMSEA	0.025	0.025	0.023	0.024	0.023

Note: Completely standardized parameters
All education variables are scaled

the weakest qualification measure, EDULVLa. In the best model (2) we model respondent's education with double indicators and use the best qualification measure EDLVdXX to measure partner's and parents' education levels. The results reveal that in model 1 the direct effects (parental occupations on respondent's occupation and parental educations on partner's education) are much larger than in model 2, while the indirect effects via education (parental educations on respondent's education and respondent's education on occupation) are indeed much smaller in model 1. The average difference in explained variance is 9.8% in favour of model 2. If we compare the results for model 2 with those for model 1 in Table 3.3, we see that latent variable modelling of respondent's education increases the explained variance by an average of 2.8% compared to the best single indicator model.

To sum up, EDLVdXX, the scaled country-specific variable, is the best indicator, closely followed by the harmonized EDULVLb. EISCED, despite its much reduced number of categories, produces only slightly poorer results and outperforms

Table 3.4: Model parameters for ALL COUNTRIES ESS R5 (N=41,264): the worst versus the best possible model

	Model	
	1 (Worst)	2 (Best)
	Single indicator model	Latent variable model
	EDUYRS	EDUYRS EDLVdXX
STRUCTURAL MODELS		
INDEPENDENT VARIABLES	**DEPENDENT VARIABLES**	
	(1) Respondent's education	
Father's Education	0.167	0.208
Mother's Education	0.152	0.162
Father's Occupation	0.145	0.156
Mother's Occupation	0.108	0.130
R^2	**0.224**	**0.302**
	(2) Partner's education	
Father's / Mother's Education	0.122	0.085
Respondent's Education	0.416	0.549
R^2	**0.304**	**0.413**
	(3) Respondent's occupation	
Father's / Mother's Occupation	0.091	0.031
Respondent's Education	0.489	0.634
R^2	**0.332**	**0.440**
FIT STATISTICS		
RMSEA	0.027	0.020

Note: Completely standardized parameters
Model 1: education level of partner and parents measured with scaled EDULVLa
Model 2: education level of partner and parents measured with scaled EDLVdXX

both EDULVL and EDULVLa by a considerable margin. The ESS effort to improve upon EDULVL/EDULVLa must therefore be acknowledged to have been very successful. The corrections and reclassifications implemented by ESS have significantly reduced aggregation error and thus improved measurement quality. Both EISCED and EDULVLb are high-quality indicators of education level. The best results, however, are yielded by means of latent variable modelling.

3.7 Conclusions and discussion

In this article, we have described all ESS education variables and documented how they are related to each other. Including them in status attainment models, we have assessed their respective measurement quality and hence their impact on structural coefficients in the model. We have found that measurement quality crucially affects the structural coefficients, with the direct effects decreasing

with better measurement, and the indirect effects via education increasing. Our analyses demonstrate that harmonization affects the quality of education measures in a predictable way. If we compare indicators, we find that in general the measurement quality decreases with the amount of detail, i.e. the average amount of categories retained in an indicator. While it tends to be true that more detail equals higher measurement quality, we need to point out two limitations. First, the effect is not linear. The loss in measurement quality suffered by moving from EDULVL (seven categories) to EDULVLa (five categories), is only marginally smaller than that suffered by moving from EDULVLb (14 categories) to EISCED (seven categories). Second, indicators may differ in measurement quality despite having the exact same number of categories, as is the case for EISCED and EDULVL. What appears to be decisive here is the way country-specific variables were bridged in the harmonization process.

ESS deserves credit for its efforts to revise its education variables. Our analyses demonstrate that the introduction of both EDULVLb and EISCED is a major improvement compared with the previous harmonized variables EDULVL/ EDULVLa. We, moreover, welcome the introduction for partner and parents of country-specific measures along with their harmonizations. Improving the measurement for all education variables in the status attainment model has allowed us to assess the cumulative effect of each indicator. As it would greatly facilitate cross-national comparison and at the same time improve measurement quality, we would highly recommend other surveys to follow the ESS example and measure education level with the detail necessary for three-digit ISCED-coding.

A further conclusion concerns the quality of the duration measure EDUYRS. While all qualification measures have higher measurement quality, it must be emphasized that the duration measure has important advantages. First and foremost, it is useful as a second independent measure of education level. Without it, latent variable modelling would not be possible, meaning that the measurement quality of indicators could not be directly assessed and measurement errors could not be corrected. A second advantage of the duration measure is that it is a continuous measure, has comparable means across countries and rounds and is straightforward to apply in statistical analyses. If country means of education levels are to be compared, it is arguably more useful than any of the (harmonized) qualification measures.

Given the larger amount of random measurement error in EDUYRS, however, in general ISLED-scaled qualification measures, which are also continuous, are

to be preferred. We have provided ISLED-scores for all ESS harmonizations and especially recommend the application of the three-digit ISCED-2011 as a harmonization tool in surveys. Any existing education variable can in principle be converted into ISCED-2011 and recoded into ISLED, which bears the potential of ISCED-2011/ISLED becoming an equivalent for education what ISCO/ISEI is for occupation: a truly standard high-quality international measure of education. Appendix 3E provides ISLED-scores for all first and second digit distinctions and for most third-level categories of ISCED-2011, based on EDULVLb. These ISLED-scores can be transferred to any national education category that can be bridged to ISCED-2011. While exact mappings for ISCED-2011 are yet to be produced, bridging should in principle also be possible based on the old mappings for ISCED-97.

We have, furthermore, shown that latent variable modelling yields optimal measurement quality, which outperforms even the best single indicator. We believe that the advantages of this method should make latent variable modelling more attractive. Instead of costly and cumbersome remeasurement, it is sufficient to ask two alternative questions on key background variables in a single survey. The ESS applies double measurement for the respondent. Without the duration measure for partner and parents, however, it is not possible to employ latent variable modelling for them too. We see this as a lost opportunity because if we did have the duration measure for everybody and hence double indicators for all education variables, we could assess the cumulative effect of this indicator and correct for random measurement error here too. Latent variable modelling for parents and partner would, moreover, make it possible to correct for correlated error in an MTMM (Multitrait-Multimethod) model, which would further enhance measurement quality and produce more accurate regression coefficients (Schröder & Ganzeboom, 2012c).

Appendix 3.A: The country-specific variables, ESS Round 1-5

ISO	Country	R1	Cat	R2	Cat	R3	Cat	R4	Cat	R5	Cat
AT	**Austria**	no cs-var		no cs-var		no cs-var					
BE	**Belgium**	EDLVBE	11	EDLVBE	11	EDLVBE	11	**EDLVaBE**	13	**EDLVdBE**	18
BG	**Bulgaria**					EDLVBG	6			**EDLVdBG**	12
CH	**Switzerland**	EDLVCH	16	**EDLVaCH**	15	**EDLVbCH**	13	**EDLVcCH**	17	**EDLVdCH**	23
CY	**Cyprus**					EDLVCY	6	**EDLVaCY**	8	**EDLVdCY**	12
CZ	**Czech Republic**	EDLVCZ	11	EDLVCZ	11	EDLVCZ		EDLVCZ	11	**EDLVdCZ**	12
DE	**Germany**			EDLVDE	8	EDLVDE	8	EDLVDE		**EDLVdDE***	
DK	**Denmark**	EDLVDK	10	**EDLVaDK**	9	EDLVaDK	9	EDLVaDK	9	**EDLVdDK**	12
EE	**Estonia**			EDLVEE	14	**EDLVaEE**	13	**EDLVbEE**	20	**EDLVdEE**	15
ES	**Spain**	EDLVES	14	**EDLVaES**	17	EDLVaES	17	EDLVAES	17	**EDLVdES**	26
FI	**Finland**									**EDLVdFI**	14
FR	**France**	EDLVFR	11	EDLVFR	11	**EDLVaFR**	12	**EDLVbFR**	21	**EDLVdFR**	26
GB	**United Kingdom**	EDLVGB	6	**EDLVaGB**	5	EDLVGB	6	EDLVGB	6	**EDLVdGB***	21
GR	**Greece**	EDLVGR	7	EDLVGR	7			**EDLVaGR**	8	**EDLVdGR**	15
HR	**Croatia**							EDLVHR	7	**EDLVdHR**	14
HU	**Hungary**	EDLVHU	12	**EDLVaHU**	14	**EDLVaHU**	14	**EDLVbHU**	14	**EDLVdHU**	14
IE	**Ireland**	EDLVIE	7	EDLVIE	7	**EDLVaIE**	7	**EDLVbIE**	8	**EDLVdIE**	18
IS	**Iceland**			no cs-var							
IL	**Israel**	EDLVIL	14					**EDLVaIL**	11	**EDLVdIL***	
IT	**Italy**	EDLVIT	7	**EDLVaIT**							
LT	**Lithuania**							EDLVLT	12		
LU	**Luxembourg**	EDLVLU	19	EDLVLU	19						
LV	**Latvia**					EDLVLV	11	EDLVLV	11		
NL	**Netherlands**	EDLVNL	13	EDLVNL	13	EDLVNL	13	EDLVNL	13	**EDLVdNL**	17
NO	**Norway**	EDLVNO	9	EDLVNO	9	EDLVNO	9	**EDLVaNO**	9	**EDLVdNO**	14
PL	**Poland**	EDLVPL	11	**EDLVaPL**	9	EDLVaPL	10	**EDLVbPL**	10	**EDLVdPL**	14
PT	**Portugal**	EDLVPT	8	EDLVPT	8	**EDLVaPT**	10	**EDLVbPT**	12	**EDLVdPT**	17
RO	**Romania**					EDLVRO	8	EDLVRO	8		
RU	**Russia**					EDLVRU	13	EDLVRU	13	**EDLVdRU**	11
SE	**Sweden**	EDLVSE	12	EDLVSE	12	**EDLVaSE**	13	**EDLVaSE**	13	**EDLVdSE**	20
SI	**Slovenia**					EDLVSI	7	**EDLVaSI**	7	**EDLVdSI**	12
SK	**Slovakia**			EDLVSK	8	EDLVSK	8	**EDLVaSK**	9	**EDLVdSK**	18
TR	**Turkey**							EDLVTR	10		
UA	**Ukraine**			EDLVUA	7	EDLVUA	7	**EDLVaUA**	11	**EDLVdUA**	14

Note: R1 = Round 1, R2 = Round 2, etc.
Cat = Number of categories
Changes indicated by bold typeface and letters a/b/c/d in the variable name
*Self-constructed variable, syntax available upon request.

Appendix 3.B: Number of categories distinguished in EDLVdXX and EDULVLb in ESS Round 5

ISO	Country	Number of categories per variable	
		EDLVdXX (country-specific)	EDULVLb (harmonized)
BE	Belgium	18	16
BG	Bulgaria	12	11
CH	Switzerland	23	19
CY	Cyprus	11	12
CZ	Czech Republic	12	12
DE	Germany	10	18
DK	Denmark	12	12
EE	Estonia	15	15
ES	Spain	26	12
FI	Finland	14	12
FR	France	26	15
GB	United Kingdom	21	16
GR	Greece	15	13
HR	Croatia	14	12
HU	Hungary	14	13
IE	Ireland	18	14
IL	Israel	18	17
NL	Netherlands	17	17
NO	Norway	14	14
PL	Poland	14	15
PT	Portugal	17	15
RU	Romania	11	10
SE	Sweden	20	14
SI	Slovenia	12	11
SK	Slovakia	18	17
UA	Ukraine	14	12

Appendix 3.C: Availability of EISCED in ESS, Rounds 1-5

ISO	Country	R1	R2	R3	R4	R5
AT	Austria	n.a.	n.a.	n.a.	n.a.	no data
BE	Belgium	+	+	+	+	+
BG	Bulgaria	no data	no data	n.a.	n.a.	+
CH	Switzerland	+	+	+	+	+
CY	Cyprus	no data	no data	n.a.	n.a.	+
CZ	Czech Republic	+	+	no data	+	+
DE	Germany	+	+	+	+	+
DK	Denmark	+	+	+	+	+
EE	Estonia	no data	+	+	+	+
ES	Spain	+	+	+	+	+
FI	Finland	n.a.	n.a.	n.a.	n.a.	+
FR	France	n.a.	n.a.	+	+	+
GB	United Kingdom	n.a.	n.a.	n.a.	n.a.	+
GR	Greece	n.a.	n.a.	no data	n.a.	+
HR	Croatia	no data	no data	no data	+	+
HU	Hungary	+	+	+	+	+
IE	Ireland	n.a.	n.a.	n.a.	n.a.	+
IS	Iceland	no data	+	no data	no data	no data
IL	Israel	+	no data	no data	n.a.	+
IT	Italy	n.a.	no data	no data	no data	no data
LT	Lithuania	no data	no data	no data	n.a.	no data
LU	Luxembourg	+	+	no data	no data	no data
LV	Latvia	no data	no data	no data	+	no data
NL	Netherlands	+	+	+	+	+
NO	Norway	+	+	+	+	+
PL	Poland	+	+	+	+	+
PT	Portugal	n.a.	+	+	+	+
RO	Romania	no data	no data	no data	+	no data
RU	Russia	no data	no data	+	+	+
SE	Sweden	n.a.	+	+	n.a.	+
SI	Slovenia	+	+	+	+	+
SK	Slovakia	no data	+	+	+	+
TR	Turkey	no data	n.a.	no data	n.a.	no data
UA	Ukraine	no data	n.a.	n.a.	+	+

Note: grey shading = EISCED is available for all rounds
+ = EISCED is available
n.a. = EISCED is not available
No data = country did not take part in that round or data are not available

Appendix 3.D: Overview of availability of ESS education variables per round

Variable type	Person	Variable name				
		R1	R2	R3	R4	R5
Country-specific variables	respondent	EDLVXX	EDLV(a)XX	EDLV(a/b)XX	EDLV(a/b/c)XX	EDLVdXX/EDUXX
	partner	--	--	--	EDLVPXX	EDLVPdXX
	father	--	--	--	EDLVFXX	EDLVFdXX
	mother	--	--	--	EDLVMXX	EDLVMdXX
Harmonization 1	respondent	EDULVLa	EDULVLa	EDULVLa	EDULVLa	EDULVLb
	partner	EDULVLPa	EDULVLPa	EDULVLPa	EDULVLPa	EDULVLPb
	father	EDULVLFa	EDULVLFa	EDULVLFa	EDULVLFa	EDULVLFb
	mother	EDULVLMa	EDULVLMa	EDULVLMa	EDULVLMa	EDULVLMb
Harmonization 2	respondent	EISCED	EISCED	EISCED	EISCED	EISCED
	partner	--	--	--	EISCEDP	EISCEDP
	father	--	--	--	EISCEDF	EISCEDF
	mother	--	--	--	EISCEDM	EISCEDM
Duration	respondent	EDUYRS	EDUYRS	EDUYRS	EDUYRS	EDUYRS

Appendix 3.E: ISLED-scores for ISCED-2011

ISCED		ISLED
0	**Less than primary**	**17.3**
10	never attended an educational programme	17.3
20	some early childhood education	17.3
30	some primary education (without level completion)	17.3
100	**Primary**	**19.3**
200	**Lower secondary**	**31.0**
240	**Lower secondary general**	**30.2**
242	partial level completion and without direct access to upper secondary	29.9
243	level completion, without direct access to upper secondary	30.3
244	level completion, with direct access to upper secondary	30.5
250	**Lower secondary vocational**	**31.8**
252	partial level completion and without direct access to upper secondary	34.0
253	level completion, without direct access to upper secondary	29.6
254	level completion, with direct access to upper secondary	--
300	**Upper secondary**	**47.8**
340	**Upper secondary general**	**41.4**
342	partial level completion and without direct access to tertiary	39.9
343	level completion, without direct access to tertiary	40.4
344	level completion, with direct access to tertiary	44.0
350	**Upper secondary vocational**	**54.2**
352	partial level completion and without direct access to tertiary	--
353	level completion, without direct access to tertiary	53.0
354	level completion, with direct access to tertiary	55.4
400	**Post-secondary non-tertiary**	**55.4**
440	**Post-secondary non-tertiary general**	**54.2**
443	level completion, without direct access to tertiary	56.6
444	level completion, with direct access to tertiary	51.8
450	**Post-secondary non-tertiary vocational**	**56.6**
453	level completion, without direct access to tertiary	57.7
454	level completion, with direct access to tertiary	55.4
500	**Tertiary Short-cycle**	**63.5**
540	**Tertiary Short-cycle general**	**69.6**
550	**Tertiary Short-cycle vocational**	**57.4**
560	**Tertiary Short-cycle orientation unspecified**	**63.5**
600	**Bachelor or equivalent**	**74.2**
640	academic	78.0
650	professional	70.4
660	orientation unspecified	74.2
700	**Master or equivalent**	**80.9**
740	academic	83.3
750	professional	78.4
760	orientation unspecified	80.9
800	**Doctoral or equivalent**	**90.4**
840	academic	90.4
850	professional	90.4
860	orientation unspecified	90.4

Chapter 4

The Value of Dutch Degrees: Testing ISLED with Data from the International Social Survey Programme in the Netherlands [ISSP-NL]

Chapter 4 [27]

The Value of Dutch Degrees: Testing the ISLED with Data from the International Social Survey Programme [ISSP-NL]

Recently Schröder & Ganzeboom (2014) have presented quantifications of the country-specific education categories distinguished in the European Social Survey [ESS] rounds 1-4. These quantifications, labelled the International Standard Level of Education [ISLED], were generated by way of optimally scaling all country-specific education categories in the ESS in an intergenerational status attainment model and have been shown to be a better representation of education level than the comparative education measures available in ESS. In this article we validate the Dutch part of the ISLED scale on fresh data, in particular, the International Social Survey Programme data collected in the Netherlands (ISSP-NL, 2003-2008) using latent variable modelling. Latent variable modelling makes it possible to diagnose and correct random measurement error. As ISSP-NL contains two independent education measures for both respondent and partner, this dataset allows us to apply latent variable modelling twice. While this improves the measurement, it also introduces correlated error. We can estimate and correct both the random and correlated error in a Multiple-Trait Multiple-Method (MTMM) model. We find that ISLED contains less random and less correlated error than indigenous ISSP measures. The amount of error is reflected in the measurement coefficient (factor loading), which we finally decompose into a validity and a reliability part by introducing latent true score variables. We find that ISLED excels as the measure with both the highest validity and the highest reliability. Our overall conclusion is that ISLED is a valid and strong measurement of education level in the Netherlands, also when applied to fresh data.

4.1 Introduction

Measuring education level in surveys is a challenging task, which involves a number of important decisions. One crucial decision concerns the type of question to be asked. Most survey designs call for qualification questions. Here the focus is on the highest education program individuals have attended or completed.

27 This chapter is co-authored by Harry Ganzeboom. Earlier versions were presented at the ESRA conference in Lausanne (Switzerland) in 2011. An earlier Dutch version of this analysis is published as Schröder & Ganzeboom (2012a).

Such questions are typically asked in a closed format with predefined answer categories, which is where the problems begin. Due to the complex and dynamic character of national education systems, various different education types and programmes need to be somehow accommodated and listed for respondents to choose from. As it is usually beyond the scope of a questionnaire to list all existing qualifications, a number of choices have to be made. A first choice concerns the level structure. How many levels are discerned in a given system? Which levels are to be included as answer categories and in which order should they be presented? Depending on the nature of the system, this can already pose a serious challenge. The more stratified the system, the more levels need to be distinguished. Particularly for secondary and tertiary education, where many different types of vocational training coexist and differences between levels become blurred, determining the level structure can be problematic.

Once the general level structure has been established, the next choice concerns the actual listing of qualifications. This is especially difficult if national education systems have undergone reforms, as is frequently the case. Any reform leads to new programme types or names, but not to the abolition of old qualifications. Consequently a decision must be made as to which contemporary and historical educations to include and how to match them. Although any survey needs to address these issues, there appears to be little consensus which programmes exactly are to be listed per level in the questionnaire. Even for one and the same country many variations of national classifications can be found across surveys. Such national classifications may, moreover, change between different waves of one and the same survey.

Another issue is that many questionnaires contain questions on the education level not only of the respondent, but also that of the partner and parents. It is conspicuous that much more care tends to be used for the measurement of the respondent's education level than for that of other persons. Commonly, the education level of the respondent is measured with a large amount of detail or even with two different questions, while that of other persons tends to be measured with single and usually much coarser (harmonized) indicators. Given that loss in detail equals loss of information and as a consequence attenuated regression coefficients, this is rather unfortunate, especially when one wants to compare effects of both partners' educations.

However common, qualification questions are not the only way of asking people about their education level. An important alternative are duration

questions, which researchers can choose to include instead of or in addition to a qualification question. In principle, duration questions are more straightforward to ask than qualification questions, but even here a lot of variation can be found among questionnaires in the exact question formulation as well as in the added specifications. For example, is part-time education to be included and if so how? Do repeated years and on the job training count or do they not? Duration questions, moreover, may require some arithmetic on the part of respondents, who are not usually aware of the exact amount of time they have spent in education. As we will demonstrate below, this may lead to substantial error.

So far we have discussed problems involved in the data collection. But even after the data have been collected, the problems are far from over. This is especially true for comparative research. Comparative research requires education variables to be comparable, be it across time, across countries or both. In contrast to duration questions, which are directly comparable, qualification questions tend to (and should) be asked in a country-specific format and require harmonization. Just like there is no standard on how to measure the country-specific variables, however, there is no standard harmonization either. Different surveys use different methods, which as we will show below, yield different levels of measurement quality.

We can conclude then that any choice involved in the measurement of education level, both as regards data collection and data analysis, has consequences for the quality of measurement. One way of understanding and assessing these consequences is in terms of the measurement error contained in an indicator. Andrews (1984: 410) distinguishes three basic types of measurement error. The first type is *bias*, defined as a "consistent tendency for a measure to be higher or lower than it should be". The second type is *random measurement error*, defined as "deviations from the true or valid scores on one measure that are statistically unrelated to deviations in any other measure being analysed concurrently". The third error type, *correlated measurement error*, arises when analysts use multiple measures based on the same method and deviations from the true score on one measure relate to deviations in another measure. While bias is a constant error that may produce serious distortions in percentages, means and other measures of central tendency, it does not affect structural coefficients. Both random and correlated measurement error, by contrast, do affect coefficients (Andrews, 1984). If we are interested in true effect sizes, we must be aware of the influences of such errors and correct them as much as possible.

In this article we will track the presence of both random and correlated measurement error in the ISSP education measures, aiming to make four contributions. The first contribution is a validation of ISLED using fresh data, data that were not used in its derivation. This is an important test for ISLED as one could argue that it is obvious that Schröder & Ganzeboom (2014) found that ISLED outperforms indigenous ESS measures, because the ESS-data were the source data that were used to generate ISLED in the first place. The real proof has yet to be delivered. For a more serious validation of ISLED we need to estimate the amount of random error it contains when it is applied to other data. In particular, we apply the ESS-generated ISLED to six rounds of ISSP-NL (2003-2008) and compare the amount of random error contained in ISLED with that contained in the education measures provided in the ISSP data.

The second contribution of this article is to investigate the amount and effect of the correlated error arising as a consequence of the repeated application of the same measurement method for more than one person. The ISSP-NL data contain two independent measures of education not just for the respondent (as is also the case in the ESS), but also for the partner. The availability of these variables makes it possible to estimate and correct correlated measurement error in a Multiple-Trait-Multiple-Method (MTMM) model. This yields a further indication of the measurement quality of the various indicators. Once again, we compare the amount of error contained in ISLED with that of the ISSP education measures.

The third contribution we want to make is to illustrate the effect of both types of measurement error on the structural coefficients in a status attainment model. By stepwise correcting for the different types of error in the education measures, we gradually improve the model and derive disattenuated effects. Contrasting models without any error correction with fully error-corrected models, we show how much we have to gain in terms of effect sizes and explained variance.

Our fourth contribution, finally, is to further analyze the measurement quality of the various education indicators by breaking down their measurement coefficients into a validity and a reliability part. Such a procedure was proposed by Saris & Andrews (1991) and elaborated by Saris & Gallhofer (2007), who, by including both method and true score factors in their models, extended classic MTMM-models in order to separate the effects of these two quality indicators. Separating invalidity and unreliability is not possible with data in which multiple indicator measurement is only applied to respondent's education. The Saris-Andrews model provides new insights into the measurement quality of education indicators as the ISSP-NL data lends itself for this type of analysis.

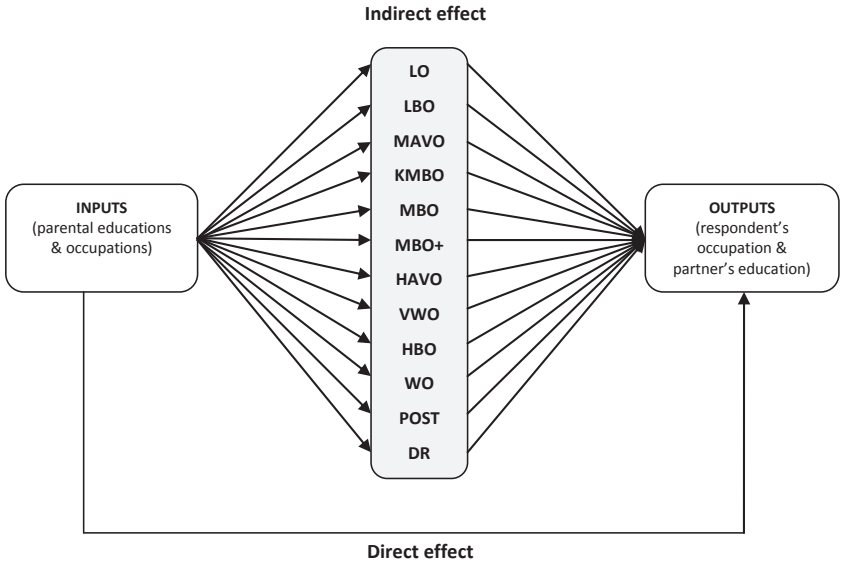
4.2 Methodological background

Schröder & Ganzeboom (2014) propose two methods to improve the quality of the education variable in comparative surveys: (A) optimal scaling as a way to maintain and exploit all the information available in detailed country-specific qualification questions, and (B) latent variable modelling which allows for the correction of random measurement error. We summarize their approach and discuss how to apply this on ISSP-NL. We then introduce methods to diagnose and correct correlated error.

Scaling

Scaling is a method that assigns score values to education categories and can either be done *ad hoc* or empirically. A common *ad-hoc* scaling method is to use the number of years nominally required to attain a given level within the institutionalized education system as score values. The idea behind such a 'virtual' duration measure resembles that of a real duration measure. It differs from it, however, in as much as it is not the actual measured length of an education career that is used, but rather the nominal or institutional length anticipated for

Figure 4.1: Measuring education levels: an optimal scaling procedure



Note: Dutch education categories: LO=primary education, LBO=lower vocational training, MAVO=lower secondary school, KMBO=short medium vocational training, MBO=medium vocational training, HAVO=medium secondary school, VWO=higher secondary school, HBO=Higher vocational training, WO=university-level education, POST=post-university education, DR=doctorate

a given course within the education system. An example of this type of scaling is the International Stratification and Mobility File (Ganzeboom & Treiman, 2012), which provides a variable that converts country-specific categories into 'pseudo-years' of education. A similar approach is also used by Hoffmeyer-Zlotnik & Warner (2007), who cluster the education categories of four countries in 10 different levels, which then function like an ordinal hierarchy.

Examples of empirical scaling are few and far between. The principle of empirical scaling lies in the exploitation of observed correlations of education categories with pertinent criterion variables, with the mean score of all individuals in a given education category being assigned to these same individuals (Schneider, 2009:32). Suitable criterion variables are variables that are strongly associated with education level, either as cause or as effect. Scaling methods can therefore be classified as cause- or effect-proportional. Treiman & Terrell (1975) applied effect-proportional scaling in a comparative study on the British and US education systems, using occupation as a criterion variable. Smith & Garnier (1987) by contrast applied cause-proportional scaling in their study on the association between background and educational attainment in France, using father's occupation as criterion. Either way, empirical scale scores lack a metric of their own and borrow as it were the metric of the criterion variable. For this reason the method has been criticized as being overly dependent on the quality of the respective criterion variable (Braun & Müller, 1997).

Schröder & Ganzeboom (2014), for their development of ISLED, integrated the two scaling methods used by their predecessors and extended these methods in three ways. First, they combined both cause and effect criterion variables in their model (Figure 4.1). Second, they used more than one variable per type. Third, rather than just borrowing the metric from any of the criterion variables, they developed a new metric. In particular they calibrated the scale scores on an independent education measure, the ESS duration measure, by equalizing the means and standard deviations of the estimated optimal scale with those of the duration variable. With this approach they address the criticisms raised above and limit the impact of each individual criterion variable, while the resulting metric itself is independent of any of the variables.

Error correction

As we have argued above, both random and correlated measurement error distort the size of structural coefficients and need to be corrected if we want to establish true effect sizes. Random measurement error can be estimated and

corrected in a simple latent variable model, where two independently measured indicators are combined. Schröder & Ganzeboom (2014) applied this method to the measurement of education level and estimated the amount of random error contained in the various ESS education indicators.

Correlated measurement error arises when double indicator measurement is used for the educations of more than one person, for example the respondent and the partner. In the ESS double measurement is restricted to the respondent and correlated error does not arise. If respondents systematically overestimate their own education level, this leads to bias, which cannot be traced. As bias does not affect the size of structural coefficients, this is not much of a problem. In the Dutch ISSP-data, by contrast, education level is measured with double indicators for respondent and partner. Now it is possible to apply latent variable modelling twice. As Schröder & Ganzeboom (2014) argue, latent variable modelling yields superior measurement quality. Due to the repeated application of the method, however, correlated error may arise, which we need to correct if we are interested in the true size of structural coefficients. Note that in contrast to random error, which underestimates effect sizes, correlated error overestimates them.

Correcting correlated measurement error is possible by combining two latent variable models in a Multiple Trait Multiple Method (MTMM) design. Such MTMM models were first proposed by psychometricians in the 1950s (Campbell & Fiske, 1959) and are currently mainly applied in attitude research for the modelling of response styles. In fact in MTMM-models both random and correlated error can be detected and corrected simultaneously. Random measurement error is diagnosed and corrected by repeating the measurement (multiple traits) and correlated measurement error by repeating the error (multiple methods).

4.3 The Dutch education system in surveys

The Dutch education system is particularly differentiated and strongly stratified. Over the years, it has repeatedly undergone changes (e.g. the so-called Mammoth-Act 1968 or the Law Education and Vocational Training 1996). Without even referring to any variation in content, dozens of different school types and follow-up courses can be distinguished, distributed over (the various levels of) primary, secondary and tertiary education. It is conspicuous that no standard survey question about the Dutch education system appears to exist. A comparison of Dutch questionnaires contained in the ISMF (Ganzeboom & Treiman, 2012) reveals the staggering reality that education level is measured differently in about every questionnaire. The classifications presented to

the respondent resemble each other of course, but questionnaires differ in the exact question formulation, the number of levels distinguished, their (implicit) hierarchical ordering as well as the concrete examples of programmes respondents get to choose from.

With 13 categories the Dutch education classification used in the European Social Survey [28] used to generate ISLED is among the most detailed internationally and is more detailed than most classifications used in other Dutch surveys. Unsurprisingly, the Dutch country-specific education variable in the ISSP is different from its ESS counterpart. With eight categories it is less detailed and the levels are presented in a slightly different order as well. Fortunately, the same current and historical qualifications have been grouped together per level, so that the ISSP classification is compatible with the ESS format and ISLED-scores can be assigned to the ISSP-NL levels without too much difficulty. Our Appendix 4A juxtaposes the two classifications and shows how they are related.

4.4 Data and method

We use six rounds of ISSP-NL data (2003-2008). After restricting our sample to individuals between 25 and 74 years of age, we are left with an effective sample of 5,732. We apply Full Maximum Likelihood (FIML) in LISREL 8.8 (Jöreskog and Sörbom, 1996) to treat missing values. The FIML method estimates a casewise likelihood function using those variables that were observed for a given case (Enders & Bandalos, 2001). Effectively, the parameter estimates are weighted with the number of respondents for the relevant correlations: if the estimate is based on a larger N, the standard error becomes small, whereas for effects that model small N correlations, the standard error becomes large.

In our analyses we show that social background variables, in particular education, are, just like any other variable, susceptible to measurement error. Although measurement error in background variables is rarely addressed in social research, we demonstrate that this is unwarranted because the error can be substantial and affects structural coefficients. Classic measurement theory, developed and mostly applied in attitude research, provides us with the necessary tools to diagnose and correct such measurement error. In order to do this, we model both education of the respondent and education of the partner as latent variables, which are each measured with two indicators, whereby we

28 In ESS-R5 the variable was adapted. With 17 categories the country-specific variables has now become even more detailed. We refer her to ESS R1-4 only because they were the data used to derive ISLED.

consider the two indicators as congeneric measurements of the same respective underlying concept.

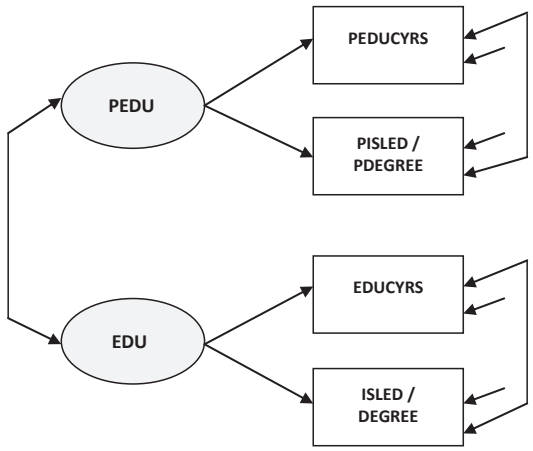
Our models combine the ISSP duration variable EDUCYRS with either the cross-nationally harmonized ISSP qualification variable DEGREE, or with the scaled country-specific qualification variable ISLED, respectively. EDUCYRS is measured in the ISSP-NL questionnaires as "the number of years of schooling after leaving primary school". This formulation attempts to avoid ambiguities arising from variations in starting age (which has changed from 7 to 4), but this may have complicated the arithmetic. DEGREE is a 6-category recode of 8 or 9 categories in the country-specific variable. In the cross-national ISSP data, the DEGREE variable is only directly available for the respondent [29], but in the national Dutch version of the data, it is also available for father, mother and partner. We have also recoded the country-specific variables for partner and parents into PDEGREE, FDEGREE and MDEGREE and assigned the ESS-derived ISLED scores to each category, thus producing ISLED, PISLED, FISLED and MISLED. As the ESS-NL and ISSP-NL variables are compatible, this is mainly a matter of a straight recode. In case where categories that were distinct in the ESS are collapsed in the ISSP, we derive new score values using a weighted average.

Figure 4.2 displays our basic MTMM measurement model for education schematically. The two latent education variables (ovals) for respondent (EDU) and partner (PEDU) are each measured with two indicators (rectangles): the duration measure and either ISLED or DEGREE. In our model, we alternate between the two. The freestanding arrows pointing to the measured variables represent their random measurement error. The connected arrows between the duration measures (EDDUR and PEDDUR) and between the two ISLED's (ISLED and PISLED) or DEGREEs (DEGREE and PDEGREE) respectively represent correlations between their residuals, the correlated error. In this form the model is not identified. It becomes identified, however, when we extend it with pertinent criterion variables in a structural (status attainment) model: the occupation of the respondent (OCC) as well as the parental occupations (FOCC, MOCC) and educations (FEDUC, MEDUC). The complete simultaneous equation model is shown in Figure 4.3.

In our analyses we proceed as follows. In a first step, we estimate three models, using EDUCYRS, DEGREE and ISLED respectively as single indicators for both respondent's and partner's education. Hereby we measure the parental

29 It turns out to be inconsistently coded across rounds. We have corrected the coding errors according to the information in the Appendix 4A.

Figure 4.2: MTMM-model for education variables

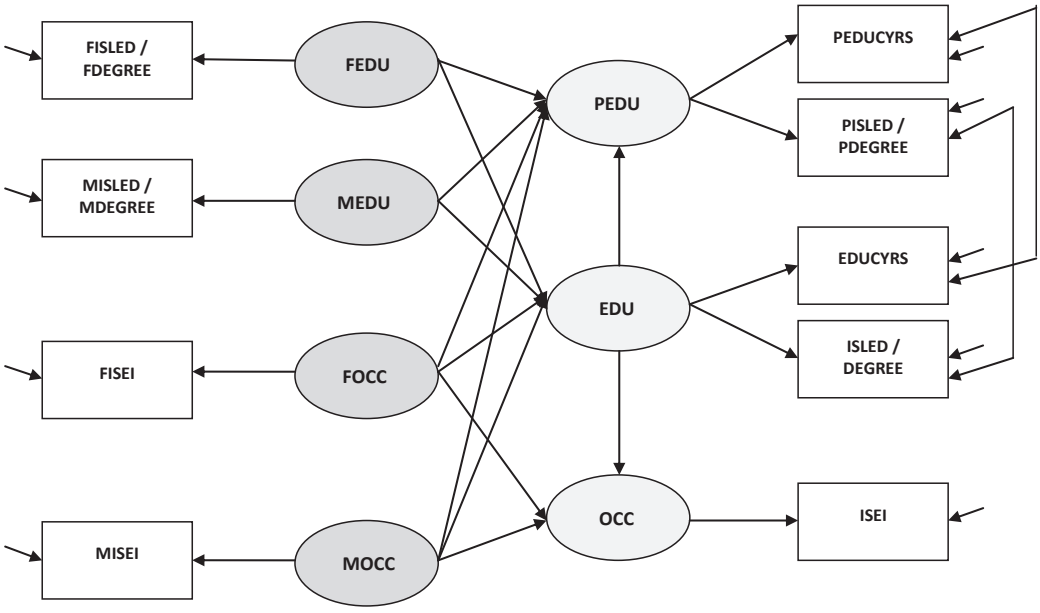


Note: Latent variables: EDU=Respondent's education; PEDU=Partner's education.. Measured variables: ISLED=International Standard Level of Education; DEGREE=ISSP-harmonization; EDUCYRS=ISSP duration measure

educations, where possible, with the same type of indicator; this is not possible for EDUCYRS, which is not available for the parents. In a second step, we estimate two models in which for respondent and partner we combine the duration measure first with the DEGREE variable and then with ISLED in a latent variable measurement model. In all models we measure the occupations with ISEI (Ganzeboom & Treiman, 1996). In a third step, in order to correct random measurement error in the parental educations, we fix their factor loadings and residuals to the values estimated for the respondent and partner. This yields the most plausible results. We can now contrast the weakest and the strongest models. In the weakest model all educations are measured with the weakest single indicator, with no error correction taking place at all. In the strongest model, by contrast, educations (except for the parental educations) are measured with double indicators and both random and correlated measurement error are corrected.

Finally, we go a step further and, following Saris & Gallhofer (2007), add true score latent variables to the measurement models for the education variables, as is shown in Figure 4.4. This makes it possible to disentangle the validity of a given indicator from its reliability, whereby the product of the reliability and validity coefficients reproduces the overall measurement coefficient previously established for the respective indicator.

Figure 4.3: The complete SEM-model



Note: Latent variables: FEDU=Father's education; MEDU=Mother's education; EDU=Respondent's education; PEDU=Partner's education; FOCC=Father's occupation; MOCC=Mother's occupation; OCC=Respondent's occupation; Measured variables: ISLED=International Standard Level of Education; DEGREE=ISSP-harmonization; EDUCYRS=ISSP duration measure; ISEI= A Standard International Socio-Economic Index of Occupational Status

4.5 Results

The first three models in Table 4.1 display the parameters of the three single indicator models. The parental educations are measured with DEGREE in models 1 and 2 and with ISLED in model 3. We see that among the single indicator models, EDUCYRS (model 1) produces by far the weakest results. If we replace EDUCYRS by the six-category ISSP harmonized variable DEGREE (model 2), we see a sharp increase by 7% and 6% respectively in explained variance in respondent's education and occupation, while the results for partner's education remain unaffected. This increase in explained variance is brought about by larger indirect effects of parental education and occupation on respondent's education and from respondent's education on occupation, while the direct effect of parental occupations on respondent's occupation diminishes. If we use ISLED (model 3), the results further improve. Compared to DEGREE, ISLED explains 2% more of the variance in respondent's education, 3% more in partner's education and 3% more in respondent's occupation.

Table 4.1: Model parameters Netherlands, ISSP-NL 2003-2008 (N=5,732)

	Single indicator models			Double indicator models				
	1	2	3	4	5	6	7	8**
	EDUCYRS	DEGREE	ISLED	EDUCYRS & DEGREE	EDUCYRS & DEGREE	EDUCYRS & ISLED	EDUCYRS & ISLED	EDUCYRS & ISLED
Correlated error correction in EDU	**NO**	**NO**	**NO**	**NO**	**YES**	**NO**	**YES**	**YES**
A. STRUCTURAL MODELS								
INDEPENDENT VARIABLES:	**DEPENDENT VARIABLES:**							
	(1) RESPONDENT'S EDUCATION							
Father's Education	0.217	0.225	0.218	0.244	0.239	0.239	0.233	0.263
Mother's Education	0.098	0.106	0.137	0.148	0.145	0.142	0.138	0.128
Father's Occupation	0.084	0.125	0.130	0.120	0.120	0.135	0.134	0.112
Mother's Occupation	0.091	0.114	0.108	0.100	0.101	0.113	0.115	0.109
R^2	**0.163**	**0.218**	**0.241**	**0.260**	**0.253**	**0.272**	**0.263**	**0.269**
	(2) PARTNER'S EDUCATION							
Father's/ Mother's Education*	0.083	0.074	0.076	0.068	0.073	0.068	0.069	0.073
Father's/ Mother's Occupation*	0.025	0.037	0.031	0.014#	0.020#	0.013#	0.019#	0.014#
Respondent's Education	0.500	0.497	0.516	0.623	0.579	0.624	0.596	0.593
R^2	**0.355**	**0.364**	**0.388**	**0.496**	**0.452**	**0.498**	**0.467**	**0.469**
	(3) RESPONDENT'S OCCUPATION							
Father's/Mother's Occupation*	0.112	0.074	0.058	0.051	0.053	0.038	0.042	0.042
Respondent's Education	0.383	0.486	0.525	0.538	0.535	0.569	0.562	0.562
R^2	**0.236**	**0.303**	**0.331**	**0.338**	**0.337**	**0.362**	**0.358**	**0.358**
B. MEASUREMENT MODELS								
EDUCYRS	**1**			**0.820**	**0.799**	**0.803**	**0.783**	**0.782**
DEGREE		**1**		**0.909**	**0.931**			
ISLED			**1**			**0.931**	**0.954**	**0.952**
C. FIT STATISTICS								
RMSEA	0.007	0.024	0.028	0.070	0.023	0.072	0.026	0.026
Df	6	6	6	20	18	20	18	18

Completely standardized parameters
All occupations are measured with ISEI
*Effects constrained to be equal; # non-significant
Measurement of parental educations: *model 1 & 2*: DEGREE; *model 3*: ISLED
***Model 8:* education level of parents measured with ISLED with factor loading fixed to 0.954 (= factor loading for respondent)

These results illustrate that it is not only feasible to apply ISLED to fresh data, but that ISLED in ISSP, just like with the ESS, outperforms indigenous indicators. Given that the Dutch country-specific ISSP variable contains only 8 or 9 categories (compared to 13 in the ESS variable), this is quite a remarkable result. Since the country-specific source variable only contains three more categories than DEGREE, it is not surprising that the difference between ISLED and DEGREE is somewhat less marked. ISLED, furthermore, outperforms the duration measure by a very wide margin indeed.

If we move to the first double indicator model 4, we again observe an increase in explained variance, brought about by the correction of random measurement error. This increase, with 2-3%, is modest in respondent's education and occupation, but with 11% is dramatic in partner's education. If we compare

models 4 and 6, we see that it does make a difference whether we use DEGREE or ISLED as second indicator and that when we use ISLED, the explained variance further increases by 1% for respondent's education and by 2% for respondent's occupation. For partner's education, using ISLED as a second indicator makes no difference. Note that in the double indicator models the effect of parental occupations on partner's education becomes insignificant. This confirms once again that better measurement leads to stronger indirect effects and weaker direct effects.

In model 5 and 7 we estimate a correlated error term between the same indicators of the latent construct. These turn out to be substantial (0.234) for the duration measures, but hardly present for the qualification indicators: 0.008 ($p < .05$) for DEGREE en -0.009 (n.s.) for ISLED. In reporting education, respondents have a tendency to give the same wrong answer when asked about duration, but have no such tendency when presented with a showcard with qualifications. If we now compare model 4 with model 5 and model 6 with model 7, we see that correcting correlated error in the latter models brings about smaller effects of respondent's education, mainly on partner's education. This effect appears to be overestimated in models 4 and 6, which do not correct for correlated measurement error. After correction the education effect decreases by 0.03-0.04 points, which is why the error-corrected models actually explain 3 and 5% less respectively of the variance in partner's education.

The measurement coefficients (factor loadings) duly reflect the quality of the individual indicators. We see that ISLED with the highest factor loading has the edge, closely followed by DEGREE, while EDUCYRS is lagging behind. Note, however, that the actual size of the coefficients is affected by the correction of correlated error. Given that we find substantial correlated error only in EDUCYRS, it is not surprising that its measurement coefficient diminishes through error correction, which is mirrored by an increase in the coefficients for DEGREE and ISLED respectively. Note also that the models that are not corrected for correlated error (models 4 & 6) do not fit, as is indicated by the fit measure RMSEA, which shoots up to 0.07, well above its acceptable range.

In model 8, finally, we correct for random measurement error in the parental ISLEDs. Since for the parents we do not have two independent measures of education, we cannot apply latent variable modelling to do this. Instead, we fix the factor loadings and residuals for the parental educations, which are measured in ISLED, to the values we have estimated for respondent and partner. The assumption here is that the amount of random error is the same between

persons. With this last step we have done everything the ISSP education measures allow for to improve our model. We observe only subtle changes in the parental effects on respondent's education. In particular, the effects of father's and mother's education on respondent's education increase by 0.03 and 0.01 points respectively, while the parental occupation effects decrease. The model explains 1% more of the variance in respondent's education and is therefore slightly better than model 7 where the factor loadings of the parental educations were still fixed to 1.

We can now contrast the weakest model (1) with the strongest model (8). This comparison leaves us with no doubt as to the potential of latent variable modelling and error correction. By using double indicators and applying full error correction in the education variable we increase the explained variance in respondent's education by about 10%, in partner's education by just over 11% and that in occupation by more than 12% compared to model 1, where EDUCYRS was used as a single indicator of level of education.

The correct measurement coefficients are:

	Measurement coefficient	Attenuation
EDUCYRS	0.783	21.7%
DEGREE	0.931	6.9%
ISLED	0.952	4.8%

With a measurement coefficient of 0.952 ISLED turns out to be the best single indicator. With 0.931 DEGREE comes second best. But even though ISLED outperforms DEGREE and duration, in the best-case scenario we still lose almost 5% of the information. By combining duration and ISLED in a latent variable model, we can overcome this loss and further disattenuate our structural coefficients, yielding the higher percentages of explained variance in the dependent variables.

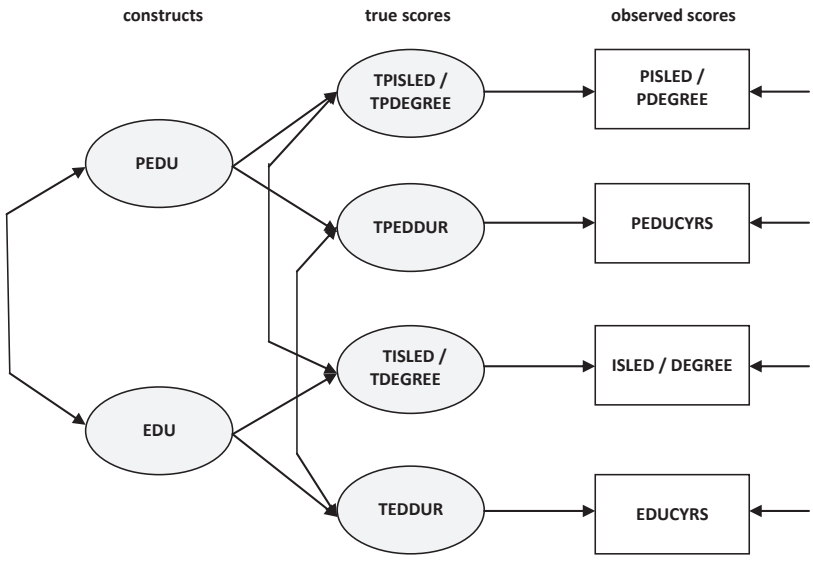
4.6 Excursus: separating validity from reliability

Saris & Andrews (1991) propose a method to break down the measurement coefficients in the MTMM design into a validity and a reliability part, which as it were allows a fine-tuning of the quality assessment of indicators. The structure of this model is given in Figure 4.4. Observed responses are in rectangles and

supplemented by two sets of latent variables. The true scores (TISLED, TEDDUR etc.) are the stable scores that underlie the observed scores ISLED, EDUYRS etc. The true scores are influenced by the latent construct we intend to measure (EDU) and a 'method; effect', here included as a correlated error between latent scores. Saris & Andrews (1991) define *reliability* as the strength of the relationship between observed response and true score, and *validity* as the strength of the relationship between the theoretical variable of interest and the true score. The correlated method effect impact the latent true score directly, but the observed score indirectly. The overall quality of a measure is then defined as the total effect of the construct on the observed indicator, which equals the multiplication of the reliability and validity coefficients.

In Table 4.2 we break down our measurement coefficients into validity and reliability parts. The results show that ISLED has both the highest validity and reliability, followed by DEGREE, which comes second in both and EDUCYRS, which turns out to be by far the least reliable and least valid measure. As predicted above, the two coefficients multiplied do indeed reproduce the measurement coefficients provided in Table 4.1. The substantive interpretation of the coefficients is as follows. The reliability coefficient estimates the stability of the answers: to what extent would respondents give the same answer if they were asked the same questions again but had forgotten about the mistakes they made

Figure 4.4: The Saris-Andrews model



Note: Latent variables: EDU=Respondent's education; PEDU=Partner's education
Measured variables: ISLED=International Standard Level of Education; DEGREE=ISSP-harmonization; EDUCYRS=ISSP duration measure

Table 4.2: Validity and reliability coefficients according to Saris-Andrews model

	EDUCYRS	DEGREE	ISLED
Validity coefficient	0.872	0.964	0.975
Reliability coefficient	0.897	0.966	0.976
Note: EDUCYRS=ISSP-duration measure; DEGREE=ISSP-harmonization; ISLED=International Standard Level of Education			

in first instance. The validity coefficients estimate to what extent the questions tap the true level of education itself and measure what you intend to measure. Our estimated coefficients confirm validity concerns that were raised by Müller (2009) and Hout & DiPrete (2006): duration is not a fully valid operationalization of level of education in a non-comprehensive education system such as in the Netherlands. They also confirm reservations about duration measurement that concentrate on possible inaccuracies and complexities when respondents are requested to do arithmetic. Duration measurement is also less reliable than qualification measurement.

4.7 Conclusion and discussion

With this article we set out to put ISLED to the test and to systematically compare its measurement quality to that of the indigenous ISSP education measures. We assessed measurement quality by comparing the amount of random and correlated measurement error contained in the various indicators. The amount of error is reflected in the respective measurement coefficients, which was subsequently broken down into a validity and a reliability part. We have demonstrated that ISLED works very well when applied to ISSP-NL data. Compared with the two indigenous comparative ISSP measures, it contains the lowest amount of both random and correlated error. ISLED duly excels in validity as well as in reliability, outperforming its ISSP competitors in either.

Both DEGREE and ISLED outperform the duration measure by a long way. The ISSP harmonization variable DEGREE actually does surprisingly well. A possible explanation for this may be that in the ISSP researchers have a considerable amount of freedom in how to harmonize the country-specific variables. The ESS coding practice by comparison is much more rigid, arguably enforcing so much rigour that education types are in danger of being misclassified. ISLED is, moreover, the only one of the three education variables we have compared here, which is free of correlated measurement error. Here again, the duration measure performs worse.

The measurement quality of the various indicators has been shown to affect the structural coefficients in a status attainment model. The difference between a

model with no error correction, which is common practice in many studies, and a fully error corrected model is striking. In the error-corrected model more than 10% more of the variance in all the dependent variables is accounted for.

ISLED turns out to be a high quality variable, but it is still not perfect. Just as Schröder & Ganzeboom (2013) with the ESS-data, we have confirmed that latent variable modelling by means of (random) error correction produces superior measurement quality. In contrast to results found by Schröder & Ganzeboom (2013), who did not find this, it does, however, appear to make a difference which measures are combined. A model that combines the duration measure with ISLED yields slightly better results than a model that instead uses DEGREE as second indicator. The fact that the ISSP-NL data contain double measurement of education level for both respondent and partner, allowed us, moreover, to correct correlated measurement error. In contrast to random error, which attenuates or underestimates regression coefficients, correlated error actually overestimates regression coefficients, albeit slightly. In order to obtain correct effect sizes, we therefore needed to and have corrected for both types of error.

Altogether, we can, for the data at hand, conclude that ISLED has successfully passed the test. We must, however, acknowledge some limitations of this test. It is limited in at least two ways. First, it pertains to only one country. Testing clearly still needs to be extended to the ISLEDs of the remaining countries and this work is forthcoming [30]. Second, the testing of ISLED has so far been limited to the status attainment model. It is, however, indispensable to also test ISLED with other variables, variables in particular that were not involved in the derivation of ISLED.

To sum up, despite its limitations, our test unequivocally illustrates that ISLED can be effectively applied to fresh data. For the Dutch ISSP data ISLED excels on all quality accounts and clearly outperforms the indigenous comparative indicators of education level contained in the ISSP.

We conclude that ISLED is not only an appropriate representation of the Dutch education system, but indeed improves the measurement quality of the education variable in the ISSP-NL data. Furthermore, we conclude that the effects of measurement error are not only worth dealing with, but actually too significant to be ignored. We therefore recommend the correction of measurement error by means of latent variable modelling wherever possible.

30 See Chapter 5 of this dissertation.

Appendix 4.A: The Dutch education system in the ESS and ISSP

European Social Survey [ESS]						International Social Survey Programme [ISSP]				
EDLVNL (country-specific)		**%**	**ISLED**	**ISCED (EDULVLa) (harmonized)**		**NL_DEGREE (country-specific)**		**ISLED**	**DEGREE (harmonized)**	
1	Niet voltooid lager onderwijs	**1**	**16.5**	**1**	Primary or less	**1**	**Lager onderwijs**	**22.5**	**0**	No formal qualification
2	**Lager** (speciaal) **onderwijs**	**10.5**	**23.1**							
3	**LBO, HHS, LTS, LHNO, VMBO-b**, VMBO-k	**16.3**	**29.3**	**2**	Lower secondary	**2**	**LBO, HHS, LHNO, LTS, VBO, VMBO-b**	**29.3**	**1**	Lowest formal qualification
4	**MAVO, ULO, MULO, VMBO-t**	**13.1**	**45.2**			**3**	**MAVO, ULO, MULO, VMBO-t**	**45.2**	**2**	Above lowest qualification
5	**KMBO**	**1.9**	**45.6**			**2.5**	**KMBO**	**45.6**	**4**	Above higher secondary education
6	**MBO**, BBL, BOL	**16.8**	**52.7**	**3**	Upper secondary	**5**	**MBO**, leerlingwezen	**52.7**		
7	MBO plus, K-HBO	**6.1**	**64.6**	**4**	Post-secondary					
8	**HAVO, MMS**, VHBO	**5.3**	**62.3**	**3**	Upper secondary	**4**	**HAVO, MMS**	**62.3**	**3**	Higher secondary education
9	**VWO, HBS**	**4.3**	**72.0**			**6**	**VWO, HBS**, Atheneum, Gymnasium	**72.0**		
10	**HBO**, Kweekschool, MO, Conservatorium	**16.3**	**77.9**	**5**	Tertiary and post-tertiary	**7**	**HBO**	**77.9**	**4**	Above higher secondary education
11	**WO**, TH, EH	**6.8**	**87.2**			**8**	Universiteit (**WO**)	**88.1**	**5**	University degree completed
12	Post-doctorale opleidingen	**1.2**	**90.7**							
13	Promotieopleidingen	**0.5**	**94.6**							

Chapter 5

The Comparative Measurement of Level of Education in the ISSP – an Application and Assessment of the ISLED scale

Chapter 5 [31]

The comparative measurement of level of education in the ISSP – an application and assessment of the ISLED scale

In cross-national survey research, level of education tends to be measured with either a harmonized qualification measure or with a duration measure. The use of scaling, by contrast, is much less common. In this article we examine whether the International Standard Level of Education [ISLED], a scale variable recently developed by Schröder & Ganzeboom (2014, 2012b) [32] using data from the European Social Survey [ESS], produces adequate results when applied to the International Social Survey Programme [ISSP]. In order to do this, we apply ISLED scores based on ISCED-2011 to the country-specific ISSP variables, which we recode for the purpose. Conceiving of level of education as a latent variable with two measured indicators (a qualification and a duration indicator), we subsequently apply latent variable modelling in a simultaneous equation model. This allows us to combine indicators and assess their individual quality as well as to correct random measurement error. We find that ISLED not only produces adequate results, but that its measurement quality is slightly better than that of the ISSP harmonization and surpasses that of the ISSP duration measure by a considerable margin. ISLED measurement quality is, however, topped by latent variable modelling. We conclude that ISLED can be readily applied to fresh data and holds the promise of becoming a truly standard international measure of level of education.

5.1 Introduction

The measurement of level of education in surveys is wrought with problems. These problems concern both data collection and analysis. Many of these problems, such as how exactly questions should be formulated to yield high-quality data, concern issues of validity and reliability and are of a general nature. The questions tend to use a predefined answer format, listing the most representative current and historical education programmes. The choice of these programmes is where the problem begins. As an exhaustive listing is generally not feasible in the limited space of a questionnaire, a choice must be made

31 This chapter is co-authored by Harry Ganzeboom. An earlier version was presented at the ECSR conference in Dublin (Ireland) 2011.

32 Chapters 2 and 3 of this dissertation.

which programmes exactly are to be included. Once this choice is made, the next difficulty is to define a hierarchical level structure to accommodate the various qualifications. Especially as regards historical programmes, it is often somewhat arbitrary which historical qualifications represent the same level of education.

The problems exacerbate when data are to be compared across countries and need to be harmonized. Establishing a definitive national classification is not straightforward and usually involves clustering some programmes together on an ad-hoc basis. Due to the great structural differences between national education systems (Allmendinger, 1989; Shavit & Müller, 1998), making such national classifications comparable across countries is a real challenge. Typically, classifications differ in their basic level structure, the number and types of programmes discerned per level, the length of programmes as well as access requirements. Even if levels are nominally comparable, qualifications representing that level may lead to different outcomes in different countries. Moreover, systems may differ so much that some qualifications simply do not have an equivalent in another country.

There are two widely used methods to tackle the comparability issue: common denominator harmonization and the application of a duration measure. The idea behind harmonization is to look for common elements in the country-specific source classifications and to establish a new integrated but often crude supranational level structure that accommodates the various national education programmes. Duration measures, by contrast, are based on a different common ground, namely that it takes a well-defined amount of time to pass through education systems, irrespective of any structural differences between them. Both methods have been criticized in the past for losing too much information and hence leading to misrepresentations of education level in comparative research. A less frequently used alternative is scaling the country-specific qualifications on a common dimension. This approach has the potential to preserve all the information contained in these measures.

In this article we examine the measurement of level of education in one of the world's leading academic comparative surveys, the International Social Survey Programme. We assess the measurement quality of ISSP's common denominator and duration measures and scale its country-specific qualification measures, exploiting the potential of a two-fold approach introduced by Schröder & Ganzeboom (2014). This approach, which was developed on data from the European Social Survey [ESS], consists of (A) measuring the level of education by

scaling all country-specific education categories into the International Standard Level of Education [ISLED] and (B) modelling level of education as a latent variable, reflected by two independent indicators in a simultaneous equation model. In this study we use the universal edition of ISLED, which was developed using data from ESS Round 5 in a sequel paper (Schröder & Ganzeboom, 2012b [33]). In particular, we apply the ISLED scale to the ISSP 2009 Social Inequality IV module (ISSP Research Group, 2012) and assess whether it matches or even surpasses the quality of the indigenous ISSP common denominator harmonization and duration measures using a latent variable model.

5.2 Conventional approaches to solving the comparability issue

One way to resolve the comparability issue for comparative research is common denominator harmonization, which allocates national education qualifications to a pre-defined level on the basis of the features they have in common. A widely used common denominator is the International Standard Classification of Education [ISCED], developed by UNESCO. ISCED was first introduced in 1976, and then updated in 1997 (UNESCO, 1997[2006]). This layered and comprehensive classification provides a well-defined classification, with extensive documentation being available on how to map (current) national education programmes onto the harmonized level structure (e.g. OECD, 1999) [34]. While ISCED-97 is highly valuable as a descriptive tool, it is generally applied to surveys in a much reduced coarse form, exploiting only its seven main levels. While this reduction in categories is problematic in itself, additional problems arise because the remaining categories are highly differentially represented in different countries, in some cases resulting in as few as three to four effective categories. Moreover, it can be hard to classify historical programmes and mistakes may arise when categories are aggregated. Existing research has shown that common denominator harmonization using ISCED-97 is error-prone and that it may lead to a critically large loss of information (e.g. Schneider, 2009; Kerckhoff & Dylan, 1999; Kerckhoff et al., 2002).

Recently, UNESCO has launched the third version of the classification, ISCED-2011 (UNSD, 2011, Schneider, 2013). It is more detailed than the previous version and comes with a versatile hierarchically organized 3-digit coding system. To our knowledge, this classification has not been used in comparative surveys as of

33 Chapter 3 of this dissertation

34 The latest update, however, does not yet include country-mappings. Here the 1997-edition is the most recent one.

yet, but it is likely to take a prominent place very soon. The exception is ESS-R5, in which an preliminary version of ISCED-2011 was already implemented in 2010 (in fact a slightly more detailed version than the final one). Using these ESS-R5 data, Schröder & Ganzeboom (2012) have derived ISLED scores using the new ISCED categories. As we will show below, the new classification is indeed very useful to harmonize country-specific categories at a rather detailed level and allows us to avoid the loss of information that was caused by its predecessor (ISCED-97).

It is fact striking that country-specific information is very little, if ever, used in comparative analysis. At best, the information is taken into account to check the development and correctness of the common denominator. There appear to be several reasons why users do not access country-specific information more frequently. First, the country-specific information is often hard to comprehend, as it requires an intimate understanding of national education systems, including their historical developments. Second, the information can be (and should be!) in different languages, but translations are either not available or not meaningful. In fact, they can even be misleading as abbreviations that are perfectly clear to an insider, across borders and across time very soon lose their meaning. Third, using the country-specific information requires a cross-national metric, which is difficult to develop. All of this can be mended by using a detailed international classification such as ISCED-2011 as a harmonization tool.

Another method of comparing levels of education cross-nationally is to abstract away from national qualification structures, and to instead base the comparison on a simple feature all education systems have in common, namely that it takes a certain well-defined amount of time to pass through a given education programme. The obvious advantage of this duration approach is that it leads to a natural and immediately comparable intrinsic metric. Any programme length can be expressed in years, making comparability unproblematic, in as far as it does not require any conversion. Moreover, a direct question format can be used in questionnaires. The method has, moreover, a clear theoretical interpretation in terms of human capital: more time spent in education equals an increase in human capital and more earnings forgone. Duration measures too, however, have been much criticized for inadequately representing some systems types and for producing skewed results (e.g. Hout & DiPrete, 2006; Müller, 2008; Schneider, 2009). Moreover, the measurement quality of those measures has been shown to be inferior to that of qualification measures.

It is striking that researchers, while ignoring the country-specific information, usually choose between the two main methods of comparative measurement and use either duration or a common denominator harmonization, but not both. Researchers seem to assume that either method yields perfectly adequate and unproblematic variables and simply choose the one that is most customary in their field of research. While there is ample evidence (e.g. Braun & Müller, 1997; Schneider, 2010) that education indicators are just as error prone as any other questionnaire item, we are not aware of any study that has used a (weighted) average of two indicators or has applied more sophisticated methods to deal with multiple indicator measurement.

5.3 An integrated empirical approach to solving the comparability issue

In an attempt to address the comparative measurement problem, Schröder & Ganzeboom (2014) have recently proposed two methods that demonstrably improve the quality of the education measurement.

In the first method they develop a novel education measure labelled the International Standard Level of Education [ISLED], which exploits all the detail contained in country-specific qualifications by scaling them on a common dimension. In particular, ISLED is developed by scaling all detailed country-specific education categories in the ESS (R1-4) to a common metric, by optimizing the role education plays in the transmutation of social backgrounds into social destinations in an extended status attainment model (Blau & Duncan, 1967). The common metric is made cross-nationally comparable by benchmarking it on the distribution of educational duration (as reported by ESS R1-4 respondents), by equalizing the country-specific means and dispersion of two distributions.

The second method proposed by Schröder & Ganzeboom (2014), latent variable modelling, combines two (independently measured) education indicators in a simultaneous equation model and exploits the presence of both a qualification and a duration question in a sophisticated way. Latent variable modelling produces unattenuated measurement because it corrects measurement error (provided the assumptions of the SEM measurement models are met). As a consequence, a latent variable model makes it possible to assess the measurement quality of either indicator used, as well as examine the consequences of measurement error for structural coefficients. Using a latent variable model, Schröder & Ganzeboom (2014) find that ISLED is the best single indicator of level of education, surpassing both the ESS common denominator harmonization (a very crude version of

ISCED-97) and duration measure by some margin. However, ISLED still attenuates results to some degree and falls short of perfect measurement, as represented by double indicator latent variable modelling.

In a sequel paper, Schröder & Ganzeboom (2012b) have applied the ISLED methodology to the ESS-R5 variables and replicate their earlier result. This time they not only scaled the country-specific categories but also two harmonized variables newly introduced in ESS-R5. One of these harmonized variables (called EDULVLb in ESS-R5), is much more detailed than previous harmonizations and matches the new ISCED-2011, discussed above. This has resulted in ISLED-scores for ISCED-2011, which we list here in Appendix 5.A. As in principle any education category can be converted into ISCED-2011 [35], we believe that the ISLED scores for ISCED-2011 have the potential of becoming a true standard comparative education measure, with wide applicability to other surveys.

5.4 Data

For our analyses we use the data of the Social Inequality IV module of the ISSP from 2009 (ISSP Research Group, 2012). This module deals with subjective perceptions and evaluations of inequality and stratification in 38 countries, 26 of which are European and overlap with ESS countries. The particular relevance of this ISSP module compared to others is that Social Inequality IV covers quite a bit of information on the stratification position of the family of origin, in particular father's and mother's occupation when the respondent was young. This is not available in other ISSP modules, but is very important to establish the value of education levels with the ISLED methodology. Moreover, the ISSP 2009 contains not only an indicator for the respondent's current occupation (which is a standard variable in all ISSP waves), but in this module a question on occupation at entry into the labour market was asked. Altogether, this information allows us to examine the measurement of education in a status attainment model (Blau & Duncan, 1967), which was also the framework for deriving the ISLED scale. Notice, however, that the stratification information in ISSP 2009 is in some respects decidedly poorer than the ESS standard background variables used by Schröder & Ganzeboom (2014, 2012a) to develop ISLED. In particular, ISSP does not contain any education measures for father, mother or partner, which were among the ingredients of the ISLED derivation.

35 Country-mappings for ISCED-2011 still need to be developed. So far they are only available for ISCED-97.

After eliminating non-European countries as well as countries that do not fulfil the requirement of two independent measurements of education, we are left with a sample of 24 countries: Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, United Kingdom, Hungary, Israel, Latvia, Netherlands [36], Norway, Poland, Portugal, Russia, Slovakia, Spain, Sweden, Switzerland, Turkey and Ukraine. Excluding respondents under 25 or over 74 years of age as well as students leaves us with an effective sample of 25,999.

Like the ESS, the ISSP dataset contains two comparative education measures, a common denominator harmonization and a duration measure. ISSP's common denominator variable is called DEGREE. Unlike similar variables in other survey projects, DEGREE is not formally defined by a reference to any detailed education classification, such as ISCED [37]. Instead, ISSP has chosen to harmonize its country-specific source variables into six categories, leaving data producers considerable freedom to code country-specific categories. The harmonized categories are:

Level	Label
0	No formal qualification
1	Lowest formal qualification
2	Above lowest qualification
3	Higher secondary completed
4	Other qualification above higher secondary
5	University degree completed

It is clear that ISSP-researchers had a single hierarchy of education in mind when devising this question format.

While duration is a compulsory question in ISSP, there was no compulsory common question format in 2009. Since 2011 the recommended question format has been: *How many years (full-time equivalents) have you been in formal education? Include all primary and secondary schooling, university and other post-secondary education, and full-time vocational training, but do not*

36 For the Netherlands the Social Inequality IV data were not yet available. In contrast to other countries, the Dutch ISSP data of the previous rounds, however, also contain the relevant criterion variables. Therefore we have used the Dutch ISSP modules on Leisure / Religion (2007/2008) instead.

37 At least, this was the case for ISSP 2009. Since 2011 ISSP has revised its policy and adopted ISCED-97 as its harmonization frame.

include repeated years. If you are currently in education, count the number of years you have completed so far. In practice, however, we have found large variation in the question formats that have been post-harmonized into the ISSP duration variable EDUCYRS. We truncated the duration variable (at 26) to avoid improbably long education lengths.

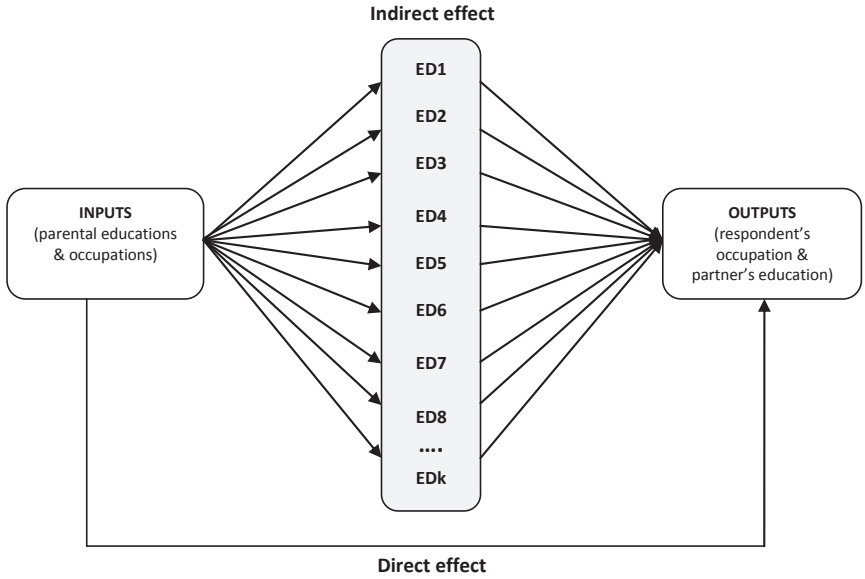
A problem is that in some ISSP countries the duration question has not been asked independently at all, but is in fact a straight recode of the country-specific qualification question. We have found this practice for Germany, Austria and Slovenia. This is problematic because in such cases we cannot combine indicators in an SEM latent variable model to obtain unattenuated measurement, as that requires independence of measurement (meaning that respondents have the opportunity to and indeed do make errors independently). We therefore had to exclude these three countries from our analyses.

5.5 Method

We apply both the ISLED scaling methodology and latent variable modelling to the ISSP 2009 data. Concerning ISLED, we do two things. First, we generate optimal scale scores for the ISSP country-specific variables, in much the same way as was previously done for the ESS, resulting in a variable that we label OPTED. Second, we apply the Schröder & Ganzeboom (2012) universal ISLED scores to the ISSP country-specific categories, which are for this purpose first converted into ISCED-2011. We then apply latent variable modelling and combine the ISSP duration measure EDUCYRS with OPTED, ISLED and the ISSP harmonization DEGREE respectively.

The procedure to derive ISLED is rooted in an intergenerational status attainment model (Figure 5.1). The model conceptualizes education as the mechanism that transmutes social origins (inputs) into social destinations (outputs). The model also determines the choice of criterion variables: all criterion variables are required to be part of the intergenerational status attainment process and be highly correlated with education level. The choice of criterion variables, however, is bounded by the availability of pertinent variables in the data. As the ISSP 2009 does not contain any information on parental education levels (which were used to derive ISLED), we have to rely solely upon parental occupations, which are ISEI-scaled (Ganzeboom & Treiman, 1996), as input variables. For the output side, we use respondent's first and current occupation. Note that all criterion variables are occupations, whereas the derivation of ISLED in the ESS

Figure 5.1: Measuring education levels: an optimal scaling procedure



Note: ED1, ED2 etc. are the respective categories within an educational classification

also involved the educations of parents and partner, but not respondent's first occupation.

In order to lose as little information as possible, we use available case information for our criterion variables, meaning that they average whatever is available as inputs or outputs. We standardize the four criterion variables within each of the 24 countries and calculate linear composites for inputs (unweighted average of father's and mother's occupation) and outputs (average of respondent's first and current occupation) respectively. Optimal scaling then involves finding weights that produce a *minimal direct* effect and a *maximal indirect* effect of social origins on destinations. In other words, education level is operationally defined as the scaling of education categories that best accounts for the conversion of social backgrounds into social destinations. Using the two composite variables (restandardized to a common Z-metric), it is easy to find the particular weighted average of the two composites by a systematic search algorithm. Despite the criterion variables in ISSP being different from those in the ESS, the algorithm finds the optimizing weights at about the same point as Schröder & Ganzeboom (2014, 2012b) found for the ESS: 0.60 for origins and 0.40 for destinations [38].

38 For the ESS the weights were 0.61 for origins and 0.39 for destinations.

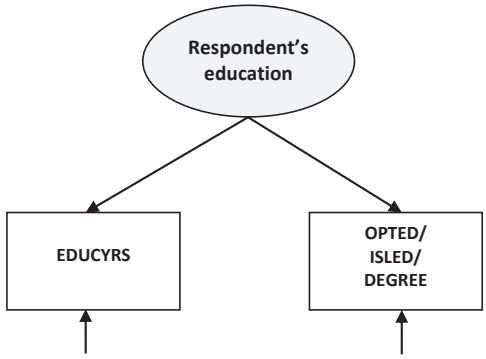
It may be important at this point to point out the difference between the OPTED scale derived on ISSP 2009 and the universal ISLED scale derived on ESS-R5. As there are no other education variables (partner's or parents' educations) among the criterion variables in the ISSP data, the OPTED optimal scores may be biased towards occupations. While we expect that scaling by occupations and scaling by other educations would yield very similar results, it is possible that the optimized scores produce associations that are closer to occupations than to other educations. Moreover, the scores are optimized with respect to the dataset that we use for validation, which will likely inflate the associations. Altogether, this means that we use OPTED merely as a point of reference, rather than presenting it as an alternative to ISLED.

In order to apply the universal ISLED scores produced by Schröder & Ganzeboom (2012b), we have converted all ISSP 2009 country-specific educations into ISCED-2011. Official conversions are not yet available. Where possible, we have used the ESS-R5 documentation as a reference to make the conversion. This cannot be done for those countries that are not included in the ESS-R5 data, such as Austria, Iceland and Latvia. For Hungary and Spain, no documentation is available for the country-specific variables in the ISSP, making it likewise impossible to employ this procedure. For those variables as well as the Cypriote, Finnish, French, Israeli, Norwegian and Slovenian ones which were not compatible in all respects, we have used our own judgment to find the best matching ISCED-2011 code. In the end all categories were converted into ISCED-2011 and assigned the respective ISLED score. It is important to note that using ISCED-2011 greatly facilitates the application of ISLED in new data. The alternative, namely the matching of the ISSP country-specific measures with the ESS country-specific-measures and then assigning the appropriate ISLED scores to them, is much more cumbersome, time-consuming and error-prone. In fact what would be needed for that is expert knowledge on the various national education systems as well as some arithmetic in applying weights in cases where ISSP categories do not have a direct equivalent, but are represented by several different ESS categories. Using ISCED-2011 instead greatly facilitates the conversion.

In order to be able to assess the measurement quality of the various education indicators, following classic measurement theory (Bentler, 1980), in the next step we model education as a latent variable, effectively reflected in two independently measured indicators, as is illustrated in Figure 5.2.

Using Full Information Maximum Likelihood treatment of missing values in LISREL 8.8 (Jöreskog & Sörbom, 1996), we estimate three simultaneous equation models

Figure 5.2: The measurement model



Note:
EDUCYRS = ISSP duration measure
OPTED = ISSP optimization
ISLED = International Standard Level of Education
DEGREE = ISSP harmonization

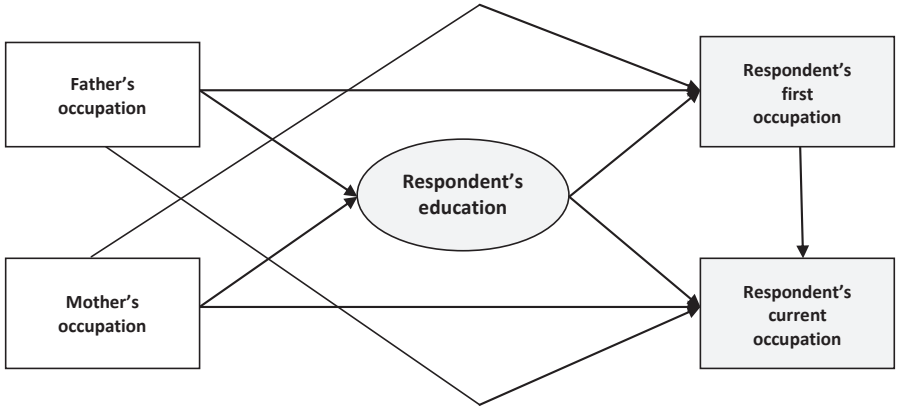
(SEM), in which one of the education indicators is the duration variable, while the other alternates the three qualification measures (OPTED, ISLED, DEGREE). This yields three sets of measurement coefficients (factor loadings), one for each indicator. The measurement model is embedded in a larger structural model consisting of three regressions equations, with respondent's education, first occupation and current occupation as dependent variables. Figure 5.3 depicts the full model.

In order to bring out the impact of measurement quality on structural coefficients in the model as well as the difference in explained variance associated with it, we also compare two different models per country, contrasting the weakest (duration as a single indicator) with the strongest model (duration and ISLED combined in a latent variable model). As all coefficients are completely standardized, they are directly comparable between these models.

5.6 Results

Table 5.1 presents the results for the three different measurement models. Each model combines the duration measure EDUCYRS with one of the three qualification variables respectively: in model 1 with the ISSP-generated OPTED, in model 2 with ESS-generated ISLED and in model 3 with the ISSP common denominator harmonization DEGREE, using a linear scaling of its six categories. We can assess the measurement quality of the individual indicators by

Figure 5.3: The structural model



Note: dependent variables are marked with grey shading

comparing their respective measurement coefficients (factor loadings). As 1.00 is the benchmark indicating unattenuated measurement, the difference to 1.00 signifies the amount of information we lose using the indicator in question in percentage points.

We see that for the pooled data across all countries (XX, first row), OPTED performs best, closely followed by ISLED and also the DEGREE variable at a rather short distance. The duration measure, by contrast, fares noticeably worse. The measurement coefficients provide an indication of the degree of attenuation each indicator causes:

	Measurement coefficient	Attenuation
OPTED	0.951	4.9%
ISLED	0.941	5.9%
DEGREE	0.936	6.4%
EDUCYRS	0.857	14.3%

A coefficient of 0.941 for ISLED means that it can be expected that any association with education (in particular when measured by a correlation or regression coefficient) is attenuated by 5.9%, if one uses this indicator. If we use duration as a single indicator we lose as much as 14.3% of the variation. While ISLED causes appreciably less attenuation than duration, one must remember that

Table 5.1: Measurement coefficients (factor loadings) of education measures ISSP 2009 (N= 25,999)

ISO	Country	Model 1	Model 2	Model 3	Model 4
		OPTED	ISLED	DEGREE	EDUCYRS
XX	**(average)**	**0.951**	**0.941**	**0.936**	**0.857**
BE	**Belgium**	0.974	0.977	0.963	0.884
BG	**Bulgaria**	0.928	0.924	0.837	0.936
CH	**Switzerland**	0.950	0.941	0.900	0.803
CY	**Cyprus**	0.967	0.982	0.986	0.965
CZ	**Czech Republic**	0.938	0.980	0.984	0.834
DK	**Denmark**	0.871	0.830	0.841	0.642
EE	**Estonia**	0.945	0.943	0.928	0.885
ES	**Spain**	1.009	1.000	0.998	0.784
FI	**Finland**	0.909	0.917	0.886	0.683
FR	**France**	0.964	0.939	0.938	0.880
GB	**United Kingdom**	0.892	0.896	0.872	0.804
HR	**Croatia**	0.957	0.948	0.960	0.926
HU	**Hungary**	0.982	0.967	0.982	0.891
IL	**Israel**	0.917	0.931	0.929	0.916
NL	**Netherlands**	0.950	0.943	0.939	0.796
NO	**Norway**	0.933	0.894	0.821	0.737
PT	**Portugal**	0.980	0.963	0.975	0.933
RU	**Russia**	0.967	0.902	0.946	0.935
SE	**Sweden**	0.929	0.927	0.936	0.826
SK	**Slovakia**	0.960	0.984	0.983	0.876
UA	**Ukraine**	0.977	0.977	0.956	0.895
SD		**0.033**	**0.040**	**0.053**	**0.086**

Note: XX = cross-country averages
OPTED = new ISLED-scale generated on ISSP-data
ISLED = ESS-ISLED scores applied to country-specific ISSP education variable
DEGREE = harmonized 6-category ISSP variable
EDUCYRS = ISSP duration measure

these estimates can only be obtained when a second independent measure is available in the data, as imperfect as it may be. Therefore the duration measure remains indispensable.

The overall quality of the education variables is also reflected in the standard deviations of the distribution of their measurement coefficients across countries, which increases with declining measurement quality. Both OPTED and ISLED are more stable in quality than DEGREE or EDUCYRS. The standard deviation for the duration measure is more than double that of the scaled variables.

Table 5.2: The worst and the best models: structural effects in an intergenerational status attainment model, with EDUCYRS and double indicators respectively as measures of level of education ISSP 2009 (N= 25,999)

			Dependent variable												
			Education (EDU)			First Occupation (OCC1)				Current occupation (OCC)					
ISO	N	Edu Indicator	FOCC-EDU	MOCC-EDU	R^2 in EDU	FOCC-OCC1	MOCC-OCC1	EDU-OCC1	R^2 in OCC1	FOCC-OCC	MOCC-OCC	EDUC-OCC	OCC1-OCC	R^2 in OCC
XX	**25,999**	**EDUCYR**	**0.231**	**0.227**	**0.155**	**0.126**	**0.091**	**0.462**	**0.317**	**0.057**	**0.029**	**0.253**	**0.491**	**0.485**
		LVM*	**0.276**	**0.256**	**0.209**	**0.071**	**0.046**	**0.586**	**0.407**	**0.031**	**0.007#**	**0.376**	**0.410**	**0.520**
BE	900	EDUCYRS	0.367	0.164	0.221	0.102	0.082#	0.502	0.352	0.057#	0.031#	0.276	0.450	0.475
		LVM	0.380	0.189	0.251	0.049#	0.048#	0.616	0.438	0.024#	0.008#	0.444	0.350	0.526
BG	731	EDUCYRS	0.272	0.307	0.271	0.139	0.026#	0.522	0.337	0.020#	0.036#	0.364	0.494	0.634
		LVM	0.289	0.331	0.310	0.095	-0.031#	0.652	0.471	0.011#	0.009#	0.461	0.442	0.654
CH	1,014	EDUCYRS	0.368	0.085	0.173	0.217	0.053#	0.484	0.395	0.052#	0.038#	0.245	0.507	0.519
		LVM	0.464	0.091	0.265	0.097	0.036#	0.644	0.507	-0.017#	0.028#	0.478	0.323	0.586
CY	835	EDUCYRS	0.170	0.408	0.289	0.173	0.093#	0.527	0.471	0.040#	0.018#	0.348	0.568	0.755
		LVM	0.222	0.399	0.328	0.137	0.080#	0.569	0.492	0.021#	0.011#	0.392	0.551	0.762
CZ	1,012	EDUCYRS	0.181	0.227	0.120	0.083	0.072	0.585	0.412	0.082	0.042#	0.187	0.614	0.624
		LVM	0.279	0.263	0.210	-0.024#	0.009#	0.757	0.564	0.032#	0.012#	0.408	0.476	0.668
DK	1,139	EDUCYRS	0.180	0.115	0.064	0.139	0.114	0.350	0.207	0.071	-0.012#	0.168	0.522	0.397
		LVM	0.278	0.176	0.152	0.019#	0.041#	0.650	0.449	0.032#	-0.031#	0.363	0.389	0.442
EE	791	EDUCYRS	0.164	0.251	0.120	0.040#	0.121	0.455	0.271	0.011#	0.043#	0.381	0.315	0.388
		LVM	0.195	0.246	0.134	0.007#	0.100	0.551	0.352	-0.007#	-0.038#	0.470	0.246	0.424
ES	715	EDUCYRS	0.199	0.254	0.167	--	--	--	--	0.241	0.096#	0.345	--	0.299
		LVM	0.268	0.262	0.228	--	--	--	--	0.147	0.055#	0.546	--	0.428
FI	711	EDUCYRS	0.193	0.163	0.099	0.076#	0.190	0.406	0.282	0.028#	0.018#	0.165	0.610	0.520
		LVM	0.224	0.329	0.241	-0.002#	0.021#	0.708	0.514	-0.006#	-0.041#	0.418	0.436	0.572
FR	2,303	EDUCYRS	0.293	0.192	0.177	0.111	0.081	0.492	0.339	0.098	0.041#	0.148	0.532	0.473
		LVM	0.344	0.173	0.206	0.055	0.073	0.586	0.412	0.069	0.037#	0.262	0.468	0.496
GB	611	EDUCYRS	0.168	0.221	0.107	0.151	0.006#	0.431	0.244	0.107	-0.007#	0.322	0.245	0.280
		LVM	0.257	0.270	0.194	0.093#	-0.041#	0.522	0.299	0.046#	-0.062#	0.531	0.155	0.380
HR	834	EDUCYRS	0.219	0.311	0.215	0.059	0.004#	0.567	0.352	0.018	0.015	0.238	0.628	0.646
		LVM	0.217	0.337	0.236	0.043#	-0.037#	0.643	0.416	0.043#	-0.037#	0.334	0.572	0.667
HU	885	EDUCYRS	0.197	0.329	0.224	0.170	0.118	0.509	0.448	0.016#	0.025#	0.184	0.727	0.766
		LVM	0.284	0.343	0.315	0.096	0.075#	0.612	0.503	-0.005#	0.012#	0.235	0.696	0.772
IL	965	EDUCYRS	0.205	0.222	0.132	0.116	0.095	0.433	0.277	0.077	0.005#	0.341	0.377	0.428
		LVM	0.200	0.334	0.212	0.107	0.022#	0.494	0.305	0.069	-0.048#	0.412	0.349	0.450
NL	2,311	EDUCYRS	0.219	0.164	0.114	0.149	0.121	0.362	0.245	0.038#	0.054	0.253	0.399	0.355
		LVM	0.261	0.203	0.165	0.097	0.078	0.507	0.344	0.015#	0.038#	0.367	0.311	0.391
NO	1,060	EDUCYRS	0.201	0.179	0.094	0.220	0.073#	0.317	0.211	0.056#	-0.016#	0.103	0.533	0.359
		LVM	0.296	0.219	0.174	0.143	0.010#	0.439	0.319	0.044#	-0.027#	0.153	0.493	0.370
PT	834	EDUCYRS	0.371	0.233	0.293	0.126	0.099	0.554	0.468	0.101	-0.009#	0.271	0.503	0.586
		LVM	0.357	0.257	0.300	0.122	0.079#	0.582	0.487	0.094	-0.025#	0.339	0.435	0.604
RU	1,266	EDUCYRS	0.145	0.316	0.165	0.158	0.075#	0.486	0.352	0.016#	0.038#	0.218	0.543	0.506
		LVM	0.182	0.328	0.199	0.130	0.054#	0.537	0.387	0.006#	0.027#	0.263	0.518	0.516
SE	934	EDUCYRS	0.279	0.166	0.144	0.104	0.104	0.316	0.172	0.101	0.007#	0.307	0.320	0.323
		LVM	0.329	0.204	0.205	0.059#	0.076	0.407	0.219	0.042#	-0.029#	0.484	0.250	0.409
SK	887	EDUCYRS	0.183	0.277	0.145	0.113	0.028	0.546	0.358	0.057#	0.052#	0.204	0.574	0.562
		LVM	0.230	0.323	0.208	0.053#	0.044#	0.695	0.488	0.037#	0.015#	0.350	0.493	0.591
UA	1,715	EDUCYRS	0.122	0.331	0.164	0.084	0.161	0.482	0.362	0.028#	0.042#	0.430	0.353	0.524
		LVM	0.181	0.339	0.208	0.033#	0.118	0.598	0.450	-0.011#	0.030#	0.571	0.256	0.576

Note: XX = cross-country averages; FOCC: Father's occupation; MOCC: Mother's occupation; #: non-significant
*LVM=latent variable modeling; indicators: ISLED & EDUCYRS

The results, while being relatively stable, fluctuate a bit per country. In some countries, for example Switzerland, the Netherlands and Norway, we find the same regular pattern as for the cross-country average, with OPTED being better than ISLED and ISLED better than DEGREE. In other countries, for example in Cyprus, the Czech Republic, Israel and Finland, ISLED outperforms OPTED, while in the Czech Republic, Croatia, Israel and Sweden the DEGREE variable turns out to work best. These differences can be explained in terms of the quality of the underlying country-specific variables. If these variables are not very detailed to begin with, ISLED scaling cannot bring about much improvement. The same holds for the way these variables represent the respective national education system. Any misrepresentations will be reflected in the scaled variables too. In other words, the quality of the scaled variables is bounded by that of the source variables and can by definition never surpass it.

Now that we have assessed the quality of the education indicators, we illustrate the bias measurement error causes in the structural coefficients in an intergenerational status attainment model. Table 5.2 shows all these effects, i.e. the effect of father's and mother's occupation on respondents' education, as well as on their first and current occupation, the effect of education on first and current occupation and, finally, the effect of first on current occupation. Per country, we contrast two sets of effects and the related explained variances in the dependent variables. In the respective top rows, education is measured with the duration variable EDUCYRS, the weakest, but widely used measurement of education. In the respective bottom rows, we apply latent variable modelling for the measurement of education with EDUCYRS and ISLED as indicators. This comparison demonstrates how much can be gained in terms of effects and explained variance when latent variable modelling is applied.

The first row of Table 5.2 shows the results for the pooled data for all countries together, while the remaining rows show the results per country. We observe a clear and ubiquitous pattern that holds in the pooled data as well as in each country individually, namely that all direct effects of inputs on outputs diminish with latent variable modelling, while all indirect effects, that run via education, increase.

Indirect effects are the product of the direct effect of parental occupations on education and the direct effect of education on occupation. We see that all these effects (FOCC, MOCC → EDU; EDU → OCC1, OCC) are severely attenuated if the duration measure is used and by the same token are much stronger with latent

variable modelling. Cross-nationally, we observe an increase by 0.12 points in the effect of education on first occupation, mirroring as it were the likewise large decrease in the direct effect of first occupation on current occupation. The increase in the parental effects on education is with roughly 0.03 points somewhat less marked. These differences in effect size, incidentally, illustrate that the attenuation caused by EDUCYRS is indeed well above 10%, as is implied by its measurement coefficient. Attenuation does, however, fluctuate with the type of effect and is much larger for the effect of education on occupation than for parental occupations on education.

Relevant direct effects in the intergenerational model are all parental effects on first and current occupation (FOCC, MOCC → OCC1, OCC). Here we see the reverse picture, namely that the parental effects are virtually halved with latent variable modelling and that in a number of countries the effects become insignificant. In eight countries this is the case for the effect of father's occupation on first occupation and in seven countries for the effect of mother's occupation on first occupation. In another five countries, the effects of father's occupation on respondent's current occupation become insignificant and in two countries, the effect of mother's occupation on respondent's occupation. The effects of mother's occupation on current occupation even become insignificant for the pooled data.

Using latent variable modelling also leads to a smaller effect of first on current occupation (OCC1 → OCC). This implies that better measurement of education accounts for a larger part of the observed continuity in occupational careers. First and current occupations are strongly associated in the ISSP 2009 data, but a large part of this continuity is due to the confounding influence of education on status attainment in both first and current/last occupation.

In line with the changes in effect size, the explained variance in all the three dependent variables, education, first occupation and current occupation, increases with latent variable modelling. On average it increases by 5.4% in the education variable, 9% in first occupation and 3.5% in current occupation. Particularly striking is the large increase in explained variance in first occupation. This suggests that the effect EDU → OCC1 (a core research problem in labour market research) in particular is greatly underestimated when EDUCYRS is used as a single indicator. The difference in explained variance does, however, depend on the individual country. With 0.23 it is largest in Finland, while with less than 0.02 it is smallest in Portugal.

Since the measurement coefficients in Table 5.1 reveal the amount of attenuation individual indicators bring about, it logically follows that using the remaining indicators, DEGREE, OPTED and ISLED as single indicators, would yield structural coefficients that fall somewhere in between the weakest and the strongest measurement. Given that those results can in principle be inferred from the size of the measurement coefficients reported in Table 5.1, it is unnecessary to report them for all indicators separately.

5.7 Conclusions and discussion

In this article we have assessed the measurement quality yielded by four different methods of measuring level of education: common denominator harmonization, duration, optimal scaling and latent variable modelling, as well as their effects on the structural coefficients in an intergenerational status attainment model. Using the ISSP Social Inequality IV module (2009), we compared the ISSP duration and harmonized measures with the International Standard Level of Education [ISLED] as well as with the combination of two indicators in latent variable models.

Our approach involves two separate methods. The first method produces two alternative sets of ISLED scores. One set is derived by optimally scaling the ISSP country-specific qualification measures themselves (resulting in an indigenous optimization). Another set is derived by applying the universal ISLED-scores that were developed by Schröder & Ganzeboom (2012b) on ESS data to the ISSP country-specific variables. In particular, we converted all country-specific ISSP-categories into ISCED-2011 (three-digits) and assigned them the appropriate ISLED scores associated with the respective level. Using the indigenous optimization as a baseline, we show that the ESS-derived ISLED comes remarkably close, with a difference in measurement quality of only one percentage point. This illustrates that ISLED-scores can be readily applied to fresh data and produce adequate results.

The second method combines each of the qualification measures with the duration measure in three different latent variable models. This allowed us to compare the quality of the individual indicators as well as to optimize measurement quality by correcting the (random) measurement error contained in each indicator. Latent variable modelling yields the best measurement quality and unattenuated structural coefficients. The best single indicator is the ISSP-optimized OPTED scale, which it is closely followed by ISLED. Remarkably, the ISSP harmonization DEGREE is only marginally inferior. Like in the ESS, the

duration variable turns out to be the weakest education indicator in the ISSP too. It entails an additional loss in measurement quality of about 8%.

The way we measure and model education level in intergenerational status attainment has a clear impact on the estimated structural coefficients. The better the measurement quality, the smaller the direct effects of inputs on outputs and by the same token the larger the indirect effects that run via education. When education level is modelled as a latent variable with two indicators, in a number of countries the direct effects of parental occupations on respondent's first and current occupations become non-significant. The direct effect of mother's occupation on respondent's current occupation becomes non-significant even for the pooled ISSP-data. The significant and substantial direct effect of mother's occupation we find when we measure education with the duration measure instead, must be attributed entirely to poor measurement quality.

There are some interesting parallels between our results on the European countries in ISSP and the ESS as analysed by Schröder & Ganzeboom (2014). First, we find virtually the same measurement coefficients for the optimized OPTED in ISSP as for ISLED in ESS, which is rather astonishing given that different criterion variables were used. Moreover, (the ESS-based) ISLED deviates from the ISSP optimized scale with only one percentage point. This is clear evidence that ISLED can be successfully applied to fresh data. Second, we find ISLED to be only marginally superior to the ISSP common denominator harmonization DEGREE. Even the optimized OPTED scale is merely 1.5% better than DEGREE. In the ESS the common denominator (EDULVLa) does decidedly worse than the optimal scale (ISLED). The difference here is 8% for Rounds 1-4 (Schröder & Ganzeboom, 2014: Table 2.3). Finally, we find that the ISSP duration measure performs marginally better than its ESS counterpart. Given that the ESS has implemented its comparative question format with much more rigor than ISSP and requires countries to use the exact same question wordings, this is rather surprising.

The comparatively high quality of both the ISSP harmonization and duration variables are somewhat puzzling. We hypothesize that this may precisely be caused by the lower level of rigor in ISSP, which allows its measurement to be more adaptive to local circumstances. ISSP researchers appear to have taken the liberty to interpret DEGREE categories to suit differences in education level that are specific to their national education systems. In ESS data producers have to live by the book (the ISCED manual) or otherwise someone will interfere

and correct their harmonization steps. Something similar may be going on in the measurement by duration. While ESS makes all respondents go through the same question formulation (which includes some arithmetic, a big no-no in questionnaire methodology books), in ISSP researchers can choose a locally appropriate formulation. Both these interpretations would speak in favour of functional equivalence as a comparative measurement principle. We would caution the ISSP not to follow ESS too closely in this respect.

Our experience with the ISSP data leads us to another recommendation with respect to coding and archiving. In ESS, as of R5, the country-specific education variables have to be coded in (the ISCED-2011 based) EDULVLb, which allows for 27 different categories. These categories almost always exhaust the national classification and fully preserve its distinctions. The method resembles the idea of the least common multiple, meaning that any education category can be accommodated and is confined to one possible place. If country-specific education data in the ISSP were also presented in such an internationally documented scheme, this would bring much clarity in these variables, which is now obscured by abbreviations, local languages, odd translations, and non-roman scripts. Implementing ISCED-2011 in its three digit version in cross-national surveys would bring the measurement of education level much closer to that of occupation, in which the detailed ISCO classification has been successfully used for similar purposes.

Appendix 2.A

Overview of the International Standard Level of Education [ISLED], ESS-R1-R4

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
AUSTRIA											
AT-R1-01	1.0	41	23	1		6.35	-2.28	-2.21	16.89	No qualification	keine Qualifikation
AT-R2-00	1.0	43	20	1		9.22	-1.77	-2.21	16.89	Incomplete primary	Pflichtschule nicht abgeschlossen
AT-R3-00	1.0	26	17	1		6.24	-1.94	-2.21	16.89	Incomplete primary	Pflichtschule nicht abgeschlossen
AT-R1-02	2.0	670	509	2		9.58	-0.97	-1.20	30.62	Compulsary school	Pflichtschule
AT-R2-01	2.0	573	283	2		9.02	-1.10	-1.20	30.62	Primary	Pflichtschule
AT-R3-01	2.0	514	275	2		9.26	-1.32	-1.20	30.62	Primary	Pflichtschule
AT-R1-03	3.0	762	642	3		12.01	-0.10	-0.32	46.38	Intermediate school	Abschluss einer weiterbildenden Schule
AT-R2-02	3.0	877	746	3		11.40	-0.37	-0.32	46.38	Lower secondary	Abschluss einer weiterbildenden Schule, BMS, Berufslehre, Berufsschule
AT-R3-02	3.0	989	840	3		11.81	-0.37	-0.32	46.38	Lower secondary	Abschluss einer weiterbildenden Schule, BMS, Berufslehre, Berufsschule
AT-R1-04	4.0	490	349	3		13.70	0.59	0.68	65.07	High school graduates	Matura
AT-R2-03	4.0	474	303	3		13.20	0.65	0.68	65.07	Upper secondary	Höhere Schule mit Matura (AHS, BHS)
AT-R3-03	4.0	496	314	3		13.84	0.64	0.68	65.07	Upper secondary	Höhere Schule mit Matura (AHS, BHS)
AT-R1-05	5.0	287	257	5		17.87	1.60	1.75	80.38	Academic degree [University degree or equivalent]	akademischer Grad, Fachhochschulabschluss oder äquivalent
AT-R2-04	5.1	108	97	4		15.07	0.94	1.11	72.05	Post secondary, non-tert	Ausbildung nach Abschluss einer Höheren Schule, Bakkalaureat, hochschulverwandte Lehranstalt (berufsbildende, pädagogische, Akademie), Kolleg
AT-R3-04	5.1	178	156	4		15.42	1.06	1.11	72.05	Post secondary, non-tert	Ausbildung nach Abschluss einer Höheren Schule, Bakkalaureat, hochschulverwandte Lehranstalt (berufsbildende, pädagogische, Akademie), Kolleg
AT-R2-06	5.2	181	166	5		18.75	1.98	2.13	84.90	Tertiary second stage	akademischer Grad, (Fach-) Hochschulabschluss oder äquivalent
AT-R3-05	5.2	198	180	5		18.59	1.91	2.13	84.90	Tertiary	akademischer Grad, (Fach-) Hochschulabschluss oder äquivalent

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
BELGIUM											
BE-R1-00	0.0	30	20	1	1	6.05	-1.07	-1.43	23.40	Not completed primary education	Niet voltooid lager onderwijs
BE-R2-00	0.0	27	20	1	1	5.28	-1.46	-1.43	23.40	Not completed primary education	Niet voltooid lager onderwijs
BE-R3-00	0.0	19	11	1	1	5.09	-1.82	-1.43	23.40	Not completed primary education	Niet voltooid lager onderwijs
BE-R4-00	0.0	22	13	1	1	6.38	-1.80	-1.43	23.40	Not completed primary education	Niet voltooid lager onderwijs, speciaal lager onderwijs, bijzonder lager onderwijs
BE-R1-01	1.0	253	172	1	1	7.45	-1.47	-1.35	24.61	Primary, basic, and special primary education	Lager onderwijs, basisschool, speciaal lager onderwijs, bijzonder lager onderwijs
BE-R2-01	1.0	200	145	1	1	7.44	-1.34	-1.35	24.61	Primary, basic, and special primary education	Lager onderwijs, basisschool, speciaal lager onderwijs, bijzonder lager onderwijs
BE-R3-01	1.0	209	137	1	1	7.36	-1.39	-1.35	24.61	Primary, basic, and special primary education	Lager onderwijs, basisschool, speciaal lager onderwijs, bijzonder lager, onderwijs
BE-R4-01	1.0	193	119	1	1	7.77	-1.44	-1.35	24.61	Primary, basic, and special primary education	Lager onderwijs, basisschool, speciaal lager onderwijs bijzonder lager onderwijs
BE-R1-02	2.0	194	143	2	2	9.98	-1.04	-1.00	31.07	lower secondary vocational education	Lager beroepsonderwijs, lagere technische school
BE-R2-02	2.0	195	145	2	2	10.08	-0.93	-1.00	31.07	lower secondary vocational education	Lager beroepsonderwijs, lagere technische school
BE-R3-02	2.0	233	170	2	2	9.91	-1.16	-1.00	31.07	Lower secondary vocational education	Lager beroepsonderwijs, lagere technische school
BE-R4-02	2.0	214	154	2	2	10.11	-1.03	-1.00	31.07	Lower secondary vocational education	Lager beroepsonderwijs, lagere technische school
BE-R1-04	3.0	194	154	3	3	11.51	-0.66	-0.74	36.53	higher secondary vocational education	Hoger secundair beroepsonderwijs (A3)
BE-R2-04	3.0	199	168	3	3	11.39	-0.78	-0.74	36.53	higher secondary vocational education	Hoger secundair beroepsonderwijs (A3)
BE-R3-04	3.0	191	156	3	3	11.76	-0.75	-0.74	36.53	Higher secondary vocational education [A3]	Hoger secundair beroepsonderwijs (A3)
BE-R4-04	3.0	155	131	3	3	11.80	-0.89	-0.74	36.53	Higher secondary vocational education (A3)	Hoger secundair beroepsonderwijs (A3)
BE-R1-03	4.0	178	109	2	2	10.06	-0.63	-0.60	39.43	lower secondary general education	Lager algemeen secundair onderwijs
BE-R2-03	4.0	180	97	2	2	10.22	-0.60	-0.60	39.43	lower secondary general education	Lager algemeen secundair onderwijs

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
BE-R3-03	4.0	184	91	2	2	10.02	-0.53	-0.60	39.43	Lower secondary general education	Lager algemeen secundair onderwijs
BE-R4-03	4.0	139	71	2	2	10.32	-0.79	-0.60	39.43	Lower secondary general education	Lager algemeen secundair onderwijs
BE-R1-05	5.0	253	189	3	4	12.79	-0.10	-0.21	47.52	higher secondary technical, or 7th year vocational education	Hoger secundair technisch (A2), zevende jaar beroepsonderwijs
BE-R2-05	5.0	252	188	3	4	12.82	-0.27	-0.21	47.52	higher secondary technical, or 7th year vocational education	Hoger secundair technisch (A2), zevende jaar beroepsonderwijs
BE-R3-05	5.0	232	194	3	4	12.62	-0.27	-0.21	47.52	higher secondary technical, or 7th year vocational education	Hoger secundair technisch (A2)
BE-R4-05	5.1	244	191	3	4	13.10	-0.34	-0.33	45.64	Higher secondary technical education (A2)	Hoger secundair technisch (A2)
BE-R4-07	5.2	39	25	4	4	12.36	-0.54	-0.52	41.34	7th year of vocational education and apprenticeship	Zevende jaar beroepsonderwijs (verleent toegang tot hoger onderwijs) – Opleiding onder leerovereenkomst (niet hoger onderwijs met toegang tot beroep)
BE-R1-06	6.0	252	151	3	4	12.63	0.23	0.22	58.11	higher secondary general education	Hoger algemeen secundair
BE-R2-06	6.0	236	164	3	4	12.69	0.27	0.22	58.11	higher secondary general education	Hoger algemeen secundair
BE-R3-06	6.0	229	144	3	4	12.60	0.18	0.22	58.11	Higher secondary general education	Hoger algemeen secundair
BE-R4-06	6.0	213	141	3	4	12.72	0.24	0.22	58.11	Higher secondary general education	Hoger algemeen secundair
BE-R1-07	7.0	261	215	5	6	15.02	0.93	0.93	72.78	higher education, short type [HOKT]	Hoger onderwijs korte type (HOKT) (A1)
BE-R2-07	7.0	266	232	5	6	14.94	1.08	0.93	72.78	higher education, short type (HOKT)	Hoger onderwijs korte type (HOKT) (A1)
BE-R3-07	7.0	280	249	5	6	14.93	1.01	0.93	72.78	Higher education, short type [HOKT] [A1]	Hoger onderwijs korte type (HOKT) (A1)
BE-R4-08	7.0	292	258	5	6	15.29	0.89	0.93	72.78	Higher education, short type (HOKT) (A1)	Hoger onderwijs korte type (HOKT) (A1)
BE-R1-08	8.0	79	67	5	7	16.24	1.55	1.23	77.92	higher education, long type [HOLT]	Hoger onderwijs lange type (HOLT)
BE-R2-08	8.0	71	66	5	7	16.26	1.09	1.23	77.92	higher education, long type (HOLT)	Hoger onderwijs lange type (HOLT)
BE-R3-08	8.0	64	57	5	7	15.88	1.42	1.23	77.92	Higher education, long type [HOLT]	Hoger onderwijs lange type (HOLT)

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
BE-R4-09	8.0	84	75	5	7	16.41	1.14	1.23	77.92	Higher education, long type (HOLT)	Hoger onderwijs van het lange type (HOLT)
BE-R1-09	9.0	143	119	5	7	16.77	2.05	1.82	85.81	university education	Universiteit
BE-R2-09	9.0	135	119	5	7	17.42	1.77	1.82	85.81	university education	Universiteit
BE-R3-09	9.0	149	133	5	7	16.76	1.98	1.82	85.81	University education	Universiteit
BE-R4-10	9.0	137	123	5	7	17.35	1.79	1.82	85.81	University education	Universiteit
BE-R1-10	10.0	32	21	5	7	15.53	1.07	1.75	85.04	doctoral and postdoctoral education	Doctoraal en postdoctoraal
BE-R2-10	10.0	16	15	5	7	18.85	2.25	1.75	85.04	doctoral and postdoctoral education	Doctoraal en postdoctoraal
BE-R3-10	10.0	7	7	5	7	18.00	1.86	1.75	85.04	doctoral and postdoctoral education	Doctoraal en postdoctoraal
BE-R4-11	10.0	19	19	5	7	20.00	2.33	1.75	85.04	Doctoral and post-doctoral education	Doctoraal en postdoctoraal
BULGARIA											
BG-R3-01	0.0	33	20	1		3.71	-1.92	-1.59	18.79	Not completed primary education	По-ниско от начално образование
BG-R4-00	0.0	59	34	1		2.00	-1.75	-1.59	18.79	No education	По-ниско от начално образование
BG-R3-02	1.0	89	53	1		4.92	-1.79	-1.52	19.77	Primary education (I-IV grade)	Начално
BG-R4-01	1.0	129	88	1		4.82	-1.68	-1.52	19.77	Incomplete primary	Начално
BG-R3-03	2.0	340	242	2		8.05	-1.23	-1.10	25.85	Lower secondary education (V-VIII grade)	Основно
BG-R4-02	2.0	534	386	2		7.89	-1.26	-1.10	25.85	Complete primary	Основно
BG-R3-04	3.0	638	531	3		11.55	0.01	-0.01	46.38	Upper secondary (IX-XIII grade)	Средно
BG-R4-03	3.0	1061	919	3		11.50	-0.01	-0.01	46.38	Lower secondary	Средно
BG-R3-05	4.0	85	77	5		14.09	0.71	0.58	58.51	Post secondary, non-tertiary education	Полувисше

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
BG-R4-04	4.0	116	107	5		14.09	0.64	0.58	58.51	Higher secondary	Полувисше
BG-R3-06	5.0	212	191	5		16.63	1.96	1.72	80.12	Tertiary education	Висше
BG-R4-05	5.1	308	271	5		16.70	2.17	1.90	80.82	Tertiary, first degree	Висше
BG-R4-06	5.2	23	21	5		18.62	2.63	2.31	85.51	Tertiary, second degree	Следдипломна квалификация, научна степен
SWITZERLAND											
CH-R1-01	1.0	27	15	1	1	6.40	-2.57	-2.31	12.52	Incomplete compulsory school	Keine abgeschlossene obligatorische Ausbildung
CH-R2-01	1.0	74	38	1	1	7.32	-2.15	-2.31	12.52	Incomplete compulsory school	Keine abgeschlossene obligatorische Ausbildung
CH-R3-01	1.1	12	10	1	1	7.40	-2.48	-2.41	9.19	Incomplete primary school	Nicht abgeschlossene Primarschule
CH-R4-01	1.1	7	4	1	1	5.25	-2.00	-2.41	9.19	Incomplete primary school	Nicht abgeschlossene Primarschule
CH-R3-02	1.2	109	69	1	1	8.46	-1.82	-1.89	14.03	Primary school	Primarschule
CH-R4-02	1.2	104	70	1	1	8.63	-1.88	-1.89	14.03	Primary school	Primarschule
CH-R3-03	2.0	190	102	2	2	9.22	-1.42	-1.48	22.54	Secondary education, first stage	Sekundar-, Real- und Oberschule
CH-R4-03	2.0	192	86	2	2	9.06	-1.47	-1.48	22.54	Secondary education [first stage]	Sekundar-, Real- und Oberschule
CH-R1-02	2.1	313	178	2	2	8.52	-1.29	-1.38	20.72	Compulsory school	Obligatorische Schule (Sekundarschule)
CH-R2-02	2.1	290	166	2	2	8.77	-1.40	-1.38	20.72	Compulsory school	Obligatorische Schule (Sekundarschule)
CH-R1-08	2.2	21	19	3	4	11.22	0.73	0.44	58.01	2 to 3 years: general training school	2 - 3 Jahre allgemeinbildende Schule (Diplommittelschule, Verkehrsschule)
CH-R2-08	2.2	39	29	3	4	11.38	0.23	0.44	58.01	2 to 3 years: general training school	2-3 Jahre: allgemeinbildende Schule, (Diplommittelschule, Verkehrsschule)
CH-R3-04	3.0	126	102	2	2	11.07	-0.83	-0.93	30.68	Initial vocational training (1-2years)	Berufliche Grundbildung (Eidg. Berufsattest) Anlehre in Betrieb und Schule, Handelsschule (1 Jahr), allgemeinbildende Schule (1 - 2 Jahre)

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
CH-R4-04	3.0	101	84	2	2	9.82	-1.00	-0.93	30.68	Elementary vocational training [enterprise and school, 1-2 year]	Berufliche Grundbildung (Eidg. Berufsattest) Anlehre in Betrieb und Schule, Handelsschule (1 Jahr), allgemeinbildende Schule (1 - 2 Jahre),
CH-R1-03	3.1	57	46	2	2	9.76	-0.76	-0.96	27.68	Elementary vocational training [enterprise + school]	Anlehre (in Betrieb und Schule)
CH-R2-03	3.1	86	59	2	2	8.84	-1.08	-0.96	27.68	Elementary vocational training [enterprise + school]	Anlehre (in Betrieb und Schule)
CH-R1-06	3.2	45	34	2	2	9.61	-0.32	-0.31	41.03	1 year: school of commerce-domestic science school	1 Jahr Handelsschule/allgemeine Schule, Haushaltslehrjahr, Sprachaufenthalt
CH-R2-06	3.2	57	48	2	2	10.13	-0.28	-0.31	41.03	1 year: school of commerce|domestic science school	1 Jahr Handelsschule/allgemeine Schule, Haushaltslehrjahr, Sprachaufenthalt
CH-R1-07	4.0	699	616	3	3	9.19	-0.45	-0.41	38.83	Apprenticeship	Berufslehren, BMS, KV
CH-R2-07	4.0	786	668	3	3	9.39	-0.36	-0.41	38.83	Apprenticeship	Berufslehren, BMS, KV
CH-R3-05	4.0	638	546	3	3	12.62	-0.38	-0.41	38.83	Apprenticeship (vocational training, dual system)	Berufslehre (Eidg. Fähigkeitszeugnis) Lehrbetriebe, Berufsfachschulen
CH-R4-05	4.0	690	585	3	3	9.88	-0.40	-0.41	38.83	Apprenticeship [vocational training, dual system]	Berufslehre (Eidg. Fähigkeitszeugnis) Lehrbetriebe, Berufsfachschulen
CH-R3-07	5.1	120	75	3	4	14.35	0.35	0.35	56.68	School preparing for university, vocational baccalaureate	Maturitätsschulen (Berufs- und gymnasiale Maturität) Gymnasium, Lehrerseminar, Schule für Unterrichtsberufe, höhere Handelsschule
CH-R1-05	5.1	25	18	3	4	11.61	0.34	0.38	56.69	Graduation diploma school [Maturity professional]	Berufsmaturität
CH-R2-05	5.1	15	13	3	4	12.77	0.43	0.38	56.69	Maturity professional	Berufsmaturität
CH-R4-07	5.1	78	65	3	4	13.26	0.38	0.38	56.75	Vocational baccalaureate	Berufsmaturitätsschulen (Lehrerseminar, Schule für Unterrichtsberufe, Höhere Handelsschule)
CH-R1-04	5.1	188	144	3	4	12.46	0.26	0.36	56.27	Secondary school [Maturity]	Maturitätsschulen, Gymnasium, Lehrerseminar, Schule für Unterrichsberufe
CH-R2-04	5.1	135	91	3	4	12.67	0.52	0.36	56.27	Maturity [College]	Maturitätsschulen, Gymnasium, Lehrerseminar, Schule für Unterrichsberufe
CH-R4-08	5.1	54	26	3	4	12.96	0.62	0.62	62.06	School preparing for university	Gymnasiale Maturitätsschulen
CH-R3-06	5.2	86	74	3	4	14.10	0.19	0.12	50.84	General training school (3years)	Fachmittelschulen (FMS) (Fachmaturität, Fachmittelschulausweis) Diplommittelschulen (DMS), Handelsschule (3 Jahre)

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
CH-R4-06	5.2	73	61	3	4	11.89	0.05	0.12	50.84	General training school [2-3 years]	Fachmittelschulen (FMS) (Fachmaturität, Fachmittelschulausweis) Diplommittelschulen (DMS), Handelsschule (3 Jahre)
CH-R3-09	5.3	21	11	4	5	14.55	0.40	0.42	57.52	School for univ. for adults and baccal. after voc. training	Maturitätsschulen nach der Lehre und für Erwachsene (Berufsmaturität und gymnasiale Maturität)
CH-R4-10	5.3	10	7	4	5	11.29	0.92	0.42	57.52	Vocational baccalaureate after vocational training	Maturitätsschulen nach der Lehre (Berufsmaturität für Erwachsene)
CH-R4-11	5.3	5	4	4	5	13.25	-0.43	0.42	57.52	School for adult preparing for university	Maturitätsschulen für Erwachsene (Gymnasiale Maturität für Erwachsene)
CH-R3-08	6.0	58	56	4	5	14.23	0.10	0.05	53.52	Vocational training (second)	Berufsbildung (Zweitausbildung)
CH-R4-09	6.0	42	38	4	5	11.55	-0.01	0.05	53.52	Vocational training [second education]	Berufsbildung (Zweitausbildung)
CH-R1-11	6.1	50	47	5	5	11.23	0.27	0.30	54.96	Technical or vocational school [2 yrs full- 3 yrs part time]	Techniker- oder Fachschule (2 Jahre Voll- oder 3 Jahre Teilzeit)
CH-R2-11	6.1	51	47	5	5	11.23	0.34	0.30	54.96	Technical or vocational school [2 years full time]	Techniker- oder Fachschule (2 Jahre Voll- oder 3 Jahre Teilzeit)
CH-R1-09	6.2	76	69	3	4	11.07	0.32	0.32	55.42	2 to 3 years: full time vocational school	2 - 3 Jahre : Vollzeitberufsschule (Handelsschule, Lehrwerkstätte
CH-R2-09	6.2	86	73	3	4	11.85	0.32	0.32	55.42	2 to 3 years: full time vocational school	2 - 3 Jahre : Vollzeitberufsschule (Handelsschule, Lehrwerkstätte
CH-R3-10	7.0	151	144	5	5	15.61	0.49	0.47	60.39	Higher vocational training	Höhere Berufsausbildung (Diplom, Eidg. Fachausweis) Höhere Fachschulen, höhere technische Lehranstalt (HTL)
CH-R4-12	7.0	152	141	5	5	12.57	0.45	0.47	60.39	Higher vocational training	Höhere Berufsausbildung (Diplom, Eidg. Fachausweis) Höhere Fachschulen, höhere technische Lehranstalt (HTL)
CH-R1-10	7.1	181	168	5	5	10.85	0.34	0.28	54.46	Vocational higher education [with special degree]	Höhere Berufsausbildung mit Meisterdiplom, Eidgenössischer Fachausweis
CH-R2-10	7.1	171	164	5	5	10.49	0.22	0.28	54.46	Vocational higher education [with special degree]	Höhere Berufsausbildung mit Meisterdiplom, Eidgenössischer Fachausweis
CH-R1-12	7.2	116	107	5	5	12.78	0.88	1.00	69.81	Technical or vocational high school [specialized]	Höhere Fachschule, HTL, HMV, (3 Jahre Voll- oder 4 Jahre Teilzeit)
CH-R2-12	7.2	143	132	5	5	12.99	1.07	1.00	69.81	Technical or vocational high school [specialized]	Höhere Fachschule, HTL, HMV, (3 Jahre Voll- oder 4 Jahre Teilzeit)
CH-R1-13	8.1	25	21	5	6	16.19	1.31	1.46	77.94	University [3years, short bachelor s degree]	Universität (3 Jahre)
CH-R2-13	8.1	29	29	5	6	15.46	1.53	1.46	77.94	University [3years, short bachelor's degree]	Universität (3 Jahre)

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
CH-R1-14	8.2	116	104	5	7	17.15	1.97	1.93	81.98	University [4years and more, bachelor s degree]	Universität, Hochschule (4 Jahre und mehr, Lizentiat)
CH-R2-14	8.2	129	117	5	7	15.96	1.84	1.93	81.98	University [4years and more, bachelor's degree]	Universität, Hochschule (4 Jahre und mehr, Lizentiat)
CH-R3-11	8.2	112	105	5	6	16.91	1.46	1.48	75.03	Pedagogical and applied university	Fachhochschulen (FH), Pädagogische Hochschule (PH) (Master, Bachelor, Diplom, Nachdiplom)
CH-R4-13	8.2	70	62	5	6	14.29	0.98	0.99	69.71	University of applied science and pedagogical university [Master]--> [Bachelor]	Fachhochschulen (FH), Pädagogische Hochschule (PH) (Bachelor)
CH-R4-14	8.2	65	62	5	7	13.76	1.23	1.25	74.38	University of applied science and pedagogical university [Master]	Fachhochschulen (FH), Pädagogische Hochschule (PH) (Master, Diplom, Nachdiplom)
CH-R3-12	8.2	145	133	5	7	18.95	1.86	1.89	84.89	University diploma and post-graduate (including technical)	Universitäre Hochschulen, Eidg. technische Hochschulen (ETH) (Master, Bachelor, Lizentiat, Diplom, Nachdiplom)
CH-R4-15	8.2	35	28	5	6	15.21	1.65	1.67	81.15	University diploma and post-graduate (including technical)	Universitäre Hochschulen, Eidgenössische Technische Hochschulen (ETH) (Bachelor)
CH-R4-16	8.2	105	99	5	7	17.20	2.12	2.15	86.93	University diploma and post-graduate [including technical] [Master]	Universitäre Hochschulen, Eidgenössische Technische Hochschulen (ETH) (Master, Lizentiat, Diplom, Nachdiplom)
CH-R1-15	9.0	71	67	5	7	17.77	1.90	2.34	88.77	University [masters, post-grade]	Universität, Hochschule (Dissertation, Nachdiplom)
CH-R2-15	9.0	49	46	5	7	18.89	2.36	2.34	88.77	University, Technical higher specialized school [masters]	Universität, Hochschule (Dissertation, Nachdiplom)
CH-R3-13	9.0	33	27	5	7	21.04	2.57	2.34	88.77	University doctorate	Doktorat, PhD
CH-R4-17	9.0	32	30	5	7	19.34	2.84	2.34	88.77	University doctorate	Doktorat, PhD
CYPRUS											
CY-R3-01	0.0	37	20	1		0.90	-1.40	-1.47	18.77	Not completed primary education	Μη προσοντούχος
CY-R4-00	0.0	38	20	1		2.85	-1.67	-1.47	18.77	Not completed primary education	Δε συμπλήρωσε τη δημοτική εκπαίδευση
CY-R3-02	1.0	167	131	1		6.02	-1.21	-1.25	22.26	Primary or first stage of basic	Απολυτήριο Δημοτικού
CY-R4-01	1.0	187	156	1		6.07	-1.38	-1.25	22.26	Primary or first stage of basic	Πρωτοβάθμια εκπαίδευση / Δημοτικό
CY-R3-03	2.0	100	79	2		9.03	-0.68	-0.71	32.81	Lower secondary or second stage of basic	Απολυτήριο Γυμνασίου

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
CY-R4-02	2.0	112	79	2		9.59	-0.80	-0.71	32.81	Lower secondary or second stage of basic	Δευτεροβάθμια εκπαίδευση / Γυμνάσιο (μερικές τάξεις εξατάξιου γυμνασίου)
CY-R3-04	3.0	423	363	3		12.02	-0.23	-0.26	43.33	Upper secondary	Απολυτήριο Λυκείου
CY-R4-03	3.0	488	394	3		12.09	-0.31	-0.26	43.33	Upper secondary	Δευτεροβάθμια εκπαίδευση / Λύκειο (εξατάξιο γυμνάσιο, τεχνικές σχολές)
CY-R3-05	4.0	108	84	5		15.18	0.95	0.65	65.24	Diploma (Tertiary not university)	Δίπλωμα (Τριτοβάθμια μη Πανεπιστημιακή)
CY-R4-04	4.0	113	95	5		14.59	0.43	0.65	65.24	Post secondary, tertiary NOT university	Δίπλωμα (Τριτοβάθμια μη Πανεπιστημιακή)
CY-R3-06	5.0	148	125	5		16.43	1.95	1.89	83.61	Bachelor/Master/PhD	Πτυχίο τριτοβάθμιας εκπαίδευσης (Πανεπιστήμιο)
CY-R4-05	5.1	213	183	5		16.32	1.42	1.37	79.29	First stage of tertiary, Bachelor-Ptychio	Πτυχίο τριτοβάθμιας εκπαίδευσης
CY-R4-06	5.2	48	46	5		18.39	2.44	2.09	88.61	Second stage of tertiary, Master	Μεταπτυχιακό
CY-R4-07	5.3	14	12	5		19.25	1.01	2.09	88.61	PhD	Διδακτορικό
CZECH REPUBLIC											
CZ-R1-00	0.0	15	5	1	1	7.00	-2.75	-1.91	25.89	Uncompleted primary	Nedokončené základní vzdělání
CZ-R2-00	0.0	27	10	1	1	6.86	-2.02	-1.91	25.89	Uncompleted primary	Nedokončené základní vzdělání
CZ-R4-00	0.0	22	10	1	1	9.13	-1.43	-1.91	25.89	Uncompleted primary	Nedokončené základní vzdělání
CZ-R1-01	1.0	199	120	2	2	8.70	-1.56	-1.49	30.95	Primary	Základní vzdělání
CZ-R2-01	1.0	492	277	2	2	8.83	-1.45	-1.49	30.95	Primary	Základní vzdělání
CZ-R4-01	1.0	260	113	2	2	9.05	-1.55	-1.49	30.95	Primary	Základní vzdělání
CZ-R1-02	2.0	350	310	3	3	11.37	-0.72	-0.68	42.02	Vocational,no upper diploma	Vyučení bez maturity
CZ-R2-02	2.0	888	772	3	3	11.57	-0.58	-0.68	42.02	Vocational, no upper diploma	Vyučení bez maturity
CZ-R4-02	2.0	644	593	3	3	11.68	-0.80	-0.68	42.02	Vocational, no upper diploma	Vyučení bez maturity

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
CZ-R1-03	3.0	182	145	3	3	11.65	-0.24	-0.32	47.38	Secondary,no upper diploma	Střední vzdělání bez maturity
CZ-R2-03	3.0	245	215	3	3	11.88	-0.32	-0.32	47.38	Secondary, no upper diploma	Střední vzdělání bez maturity
CZ-R4-03	3.0	182	160	3	3	11.94	-0.38	-0.32	47.38	Secondary, no upper diploma	Střední vzdělání bez maturity
CZ-R1-04	4.0	79	68	3	4	12.90	0.10	0.05	52.80	Vocational, diploma	Vyučení s maturitou
CZ-R2-04	4.0	142	116	3	4	12.72	0.08	0.05	52.80	Vocational, diploma	Vyučení s maturitou
CZ-R4-04	4.0	138	126	3	4	13.02	0.00	0.05	52.80	Vocational, diploma	Vyučení s maturitou
CZ-R1-05	5.0	245	212	3	4	13.28	0.46	0.51	59.64	Secondary technical, diploma	Úplné střední odborné vzdělání s maturitou
CZ-R2-05	5.0	633	535	3	4	12.90	0.49	0.51	59.64	Secondary technical, diploma	Úplné střední odborné vzdělání s maturitou
CZ-R4-05	5.0	397	351	3	4	13.13	0.61	0.51	59.64	Secondary technical, diploma	Úplné střední odborné vzdělání s maturitou
CZ-R1-06	6.0	92	68	3	4	13.17	0.66	0.76	63.14	Secondary academic, diploma	Střední všeobecné vzdělání s maturitou
CZ-R2-06	6.0	277	195	3	4	12.91	0.74	0.76	63.14	Secondary academic, diploma	Střední všeobecné vzdělání s maturitou
CZ-R4-06	6.0	148	111	3	4	13.27	0.91	0.76	63.14	Secondary academic, diploma	Střední všeobecné vzdělání s maturitou
CZ-R1-07	7.0	34	29	5	5	15.64	1.34	1.40	71.47	Higher	Vyšší vzdělání (pomaturitní studium, vyšší škola, 5 a 6. roč. konzervatoře)
CZ-R2-07	7.0	61	52	5	5	15.22	1.36	1.40	71.47	Higher	Vyšší vzdělání (pomaturitní studium, vyšší škola, 5 a 6. roč. konzervatoře)
CZ-R4-07	7.0	33	30	5	5	15.43	1.60	1.40	71.47	Higher	Vyšší vzdělání (pomaturitní studium, vyšší škola, 5 a 6. roč. konzervatoře)
CZ-R1-08	8.0	18	13	5	6	16.92	1.78	1.66	74.51	Tertiary, Bc.	Vysokoškolské bakalářské vzdělání
CZ-R2-08	8.0	41	37	5	6	16.66	1.60	1.66	74.51	Tertiary, Bc	Vysokoškolské bakalářské vzdělání
CZ-R4-08	8.0	28	24	5	6	17.39	1.75	1.66	74.51	Tertiary, Bc.	Vysokoškolské bakalářské vzdělání
CZ-R1-09	9.0	108	101	5	7	17.47	2.03	2.14	79.55	Tertiary, M.A.	Vysokoškolské magisterské vzdělání

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
CZ-R2-09	9.0	181	159	5	7	17.45	2.32	2.14	79.55	Tertiary, M A	Vysokoškolské magisterské vzdělání
CZ-R4-09	9.0	136	127	5	7	17.03	2.07	2.14	79.55	Tertiary, M.A.	Vysokoškolské magisterské vzdělání
CZ-R1-10	10.0	24	20	5	7	18.32	2.66	2.63	83.87	Post-graduate	Vědecká výchova, postgraduální vzdělání
CZ-R2-10	10.0	14	11	5	7	18.91	2.69	2.63	83.87	Post-graduate	Vědecká výchova, postgraduální vzdělání
CZ-R4-10	10.0	27	25	5	7	18.09	2.64	2.63	83.87	Post-graduate	Vědecká výchova, postgraduální vzdělání
GERMANY											
DE-R1-00	0.0	64	42	1	1	7.79	-1.62	-1.57	26.91	Grundschule nicht beendet	Grundschule nicht beendet
DE-R2-00	0.0	89	61	1	1	7.98	-1.64	-1.57	26.91	Grundschule nicht beendet	Grundschule nicht beendet
DE-R3-00	0.0	71	48	2	2	9.45	-1.47	-1.57	26.91	Grundschule nicht beendet	Grundschule nicht beendet
DE-R4-00	0.0	71	44	2	2	8.57	-1.55	-1.57	26.91	Grundschule nicht beendet	Grundschule nicht beendet
DE-R3-10	1.0	182	90	1	1	9.30	-1.35	-1.34	37.36	Hauptschule	Hauptschule
DE-R1-10	1.0	175	104	2	2	9.06	-1.33	-1.34	37.36	Hauptschule	Hauptschule
DE-R2-10	1.0	197	108	2	2	8.93	-1.36	-1.34	37.36	Hauptschule	Hauptschule
DE-R4-10	1.0	159	76	2	2	9.68	-1.38	-1.34	37.36	Hauptschule	Hauptschule
DE-R1-11	1.1	32	18	3	3	9.06	-1.64	-1.46	28.68	Hauptschule + Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre	Hauptschule + Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre
DE-R2-11	1.1	36	23	3	3	9.57	-1.51	-1.46	28.68	Hauptschule + Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre	Hauptschule + Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre
DE-R3-11	1.1	57	34	3	3	9.52	-1.45	-1.46	28.68	Hauptschule + Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre	Hauptschule + Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
DE-R4-11	1.1	25	19	3	3	10.63	-1.31	-1.46	28.68	Hauptschule + Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre	Hauptschule + Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre
DE-R1-12	1.2	25	20	3	3	9.80	-1.16	-1.45	28.87	Hauptschule + Teilfacharbeiterabschluss	Hauptschule + Teilfacharbeiterabschluss
DE-R2-12	1.2	33	28	3	3	9.88	-1.65	-1.45	28.87	Hauptschule + Teilfacharbeiterabschluss	Hauptschule + Teilfacharbeiterabschluss
DE-R3-12	1.2	17	13	3	3	10.15	-1.22	-1.45	28.87	Hauptschule + Teilfacharbeiterabschluss	Hauptschule + Teilfacharbeiterabschluss
DE-R4-12	1.2	27	22	3	3	10.59	-1.62	-1.45	28.87	Hauptschule + Teilfacharbeiterabschluss	Hauptschule + Teilfacharbeiterabschluss
DE-R1-13	1.3	406	346	3	3	10.77	-1.10	-1.08	35.44	Hauptschule + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre	Hauptschule + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre
DE-R2-13	1.3	376	324	3	3	11.05	-1.05	-1.08	35.44	Hauptschule + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre	Hauptschule + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre
DE-R3-13	1.3	427	364	3	3	11.34	-1.00	-1.08	35.44	Hauptschule + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre	Hauptschule + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre
DE-R4-13	1.3	335	281	3	3	11.59	-1.23	-1.08	35.44	Hauptschule + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre	Hauptschule + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre
DE-R1-14	1.4	164	129	3	3	11.13	-0.62	-0.57	45.50	Hauptschule + Abgeschlossene kaufmännische Lehre	Hauptschule + Abgeschlossene kaufmännische Lehre
DE-R2-14	1.4	165	138	3	3	11.32	-0.40	-0.57	45.50	Hauptschule + Abgeschlossene kaufmännische Lehre	Hauptschule + Abgeschlossene kaufmännische Lehre
DE-R3-14	1.4	156	126	3	3	11.50	-0.52	-0.57	45.50	Hauptschule + Abgeschlossene kaufmännische Lehre	Hauptschule + Abgeschlossene kaufmännische Lehre
DE-R4-14	1.4	131	115	3	3	11.57	-0.75	-0.57	45.50	Hauptschule + Abgeschlossene kaufmännische Lehre	Hauptschule + Abgeschlossene kaufmännische Lehre
DE-R1-15	1.5	8	5	2	2	12.00	-0.76	-0.80	40.90	Hauptschule + Berufliches Praktikum, Volontariat	Hauptschule + Berufliches Praktikum, Volontariat
DE-R2-15	1.5	9	6	2	2	11.80	-0.82	-0.80	40.90	Hauptschule + Berufliches Praktikum, Volontariat	Hauptschule + Berufliches Praktikum, Volontariat
DE-R3-15	1.5	2	2	2	2	10.00	-1.87	-0.80	40.90	Hauptschule + Berufliches Praktikum, Volontariat	Hauptschule + Berufliches Praktikum, Volontariat
DE-R4-15	1.5	4	3	2	2	12.00	-0.47	-0.80	40.90	Hauptschule + Berufliches Praktikum, Volontariat	Hauptschule + Berufliches Praktikum, Volontariat

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
DE-R1-16	1.6	40	34	3	3	11.65	-0.49	-0.42	48.46	Hauptschule + Fachschulabschluss	Hauptschule + Fachschulabschluss
DE-R2-16	1.6	34	29	3	3	12.93	-0.60	-0.42	48.46	Hauptschule + Fachschulabschluss	Hauptschule + Fachschulabschluss
DE-R3-16	1.6	33	29	3	3	12.72	-0.09	-0.42	48.46	Hauptschule + Fachschulabschluss	Hauptschule + Fachschulabschluss
DE-R4-16	1.6	19	16	3	3	12.56	-0.48	-0.42	48.46	Hauptschule + Fachschulabschluss	Hauptschule + Fachschulabschluss
DE-R1-17	1.7	48	43	3	3	11.58	-0.77	-0.64	43.96	Hauptschule + Berufsfachschulabschluss	Hauptschule + Berufsfachschulabschluss
DE-R2-17	1.7	32	30	3	3	11.77	-0.68	-0.64	43.96	Hauptschule + Berufsfachschulabschluss	Hauptschule + Berufsfachschulabschluss
DE-R3-17	1.7	28	23	3	3	12.35	-0.16	-0.64	43.96	Hauptschule + Berufsfachschulabschluss	Hauptschule + Berufsfachschulabschluss
DE-R4-17	1.7	32	30	3	3	11.93	-0.81	-0.64	43.96	Hauptschule + Berufsfachschulabschluss	Hauptschule + Berufsfachschulabschluss
DE-R1-18	1.8	63	55	5	5	12.77	-0.70	-0.73	42.27	Hauptschule + Meisterabschluss	Hauptschule + Meisterabschluss
DE-R2-18	1.8	49	42	5	5	12.24	-0.50	-0.73	42.27	Hauptschule + Meisterabschluss	Hauptschule + Meisterabschluss
DE-R3-18	1.8	52	41	5	5	12.93	-1.00	-0.73	42.27	Hauptschule + Meisterabschluss	Hauptschule + Meisterabschluss
DE-R4-18	1.8	40	33	5	5	12.73	-0.72	-0.73	42.27	Hauptschule + Meisterabschluss	Hauptschule + Meisterabschluss
DE-R1-20	2.0	145	43	2	2	11.86	-0.31	-0.34	54.50	Realschule	Realschule
DE-R2-20	2.0	120	21	2	2	11.45	-0.78	-0.34	54.50	Realschule	Realschule
DE-R3-20	2.0	127	33	2	2	11.85	-0.38	-0.34	54.50	Realschule	Realschule
DE-R4-20	2.0	127	60	2	2	12.22	-0.19	-0.34	54.50	Realschule	Realschule
DE-R1-21	2.1	5	4	3	3	12.00	0.74	-0.12	54.47	Realschule + Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre	Realschule + Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre
DE-R2-21	2.1	10	7	3	3	11.71	0.22	-0.12	54.47	Realschule + Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre	Realschule + Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
DE-R3-21	2.1	13	11	3	3	10.82	-0.52	-0.12	54.47	Realschule + Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre	Realschule + Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre
DE-R4-21	2.1	11	7	3	3	10.71	-0.43	-0.12	54.47	Realschule + Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre	Realschule + Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre
DE-R1-22	2.2	4	3	3	3	12.67	-0.24	-0.64	43.96	Realschule + Teilfacharbeiterabschluss	Realschule + Teilfacharbeiterabschluss
DE-R2-22	2.2	4	4	3	3	13.00	-0.61	-0.64	43.96	Realschule + Teilfacharbeiterabschluss	Realschule + Teilfacharbeiterabschluss
DE-R3-22	2.2	7	6	3	3	12.00	-0.50	-0.64	43.96	Realschule + Teilfacharbeiterabschluss	Realschule + Teilfacharbeiterabschluss
DE-R4-22	2.2	4	3	3	3	12.00	-1.38	-0.64	43.96	Realschule + Teilfacharbeiterabschluss	Realschule + Teilfacharbeiterabschluss
DE-R1-23	2.3	271	247	3	3	12.30	-0.35	-0.45	47.88	Realschule + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre	Realschule + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre
DE-R2-23	2.3	268	230	3	3	12.46	-0.33	-0.45	47.88	Realschule + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre	Realschule + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre
DE-R3-23	2.3	285	268	3	3	12.78	-0.53	-0.45	47.88	Realschule + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre	Realschule + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre
DE-R4-23	2.3	255	233	3	3	12.79	-0.57	-0.45	47.88	Realschule + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre	Realschule + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre
DE-R1-24	2.4	268	228	3	3	12.57	0.26	0.06	58.12	Realschule + Abgeschlossene kaufmännische Lehre	Realschule + Abgeschlossene kaufmännische Lehre
DE-R2-24	2.4	234	206	3	3	12.79	0.03	0.06	58.12	Realschule + Abgeschlossene kaufmännische Lehre	Realschule + Abgeschlossene kaufmännische Lehre
DE-R3-24	2.4	273	250	3	3	12.92	0.07	0.06	58.12	Realschule + Abgeschlossene kaufmännische Lehre	Realschule + Abgeschlossene kaufmännische Lehre
DE-R4-24	2.4	248	232	3	3	12.99	-0.11	0.06	58.12	Realschule + Abgeschlossene kaufmännische Lehre	Realschule + Abgeschlossene kaufmännische Lehre
DE-R1-25	2.5	9	8	2	2	13.13	0.49	0.11	59.26	Realschule + Berufliches Praktikum, Volontariat	Realschule + Berufliches Praktikum, Volontariat
DE-R2-25	2.5	2	2	2	2	11.00	-0.13	0.11	59.26	Realschule + Berufliches Praktikum, Volontariat	Realschule + Berufliches Praktikum, Volontariat
DE-R3-25	2.5	12	9	2	2	12.67	-0.34	0.11	59.26	Realschule + Berufliches Praktikum, Volontariat	Realschule + Berufliches Praktikum, Volontariat

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
DE-R4-25	2.5	1	1	2	2	15.00	2.20	0.11	59.26	Realschule + Berufliches Praktikum, Volontariat	Realschule + Berufliches Praktikum, Volontariat
DE-R1-26	2.6	111	103	3	3	13.61	0.24	0.22	61.27	Realschule + Fachschulabschluss	Realschule + Fachschulabschluss
DE-R2-26	2.6	118	112	3	3	13.77	0.14	0.22	61.27	Realschule + Fachschulabschluss	Realschule + Fachschulabschluss
DE-R3-26	2.6	103	91	3	3	13.93	0.29	0.22	61.27	Realschule + Fachschulabschluss	Realschule + Fachschulabschluss
DE-R4-26	2.6	90	82	3	3	14.45	0.24	0.22	61.27	Realschule + Fachschulabschluss	Realschule + Fachschulabschluss
DE-R1-27	2.7	70	66	3	3	12.69	-0.21	0.08	58.55	Realschule + Berufsfachschulabschluss	Realschule + Berufsfachschulabschluss
DE-R2-27	2.7	70	55	3	3	13.64	0.11	0.08	58.55	Realschule + Berufsfachschulabschluss	Realschule + Berufsfachschulabschluss
DE-R3-27	2.7	87	74	3	3	13.42	0.11	0.08	58.55	Realschule + Berufsfachschulabschluss	Realschule + Berufsfachschulabschluss
DE-R4-27	2.7	74	67	3	3	13.28	0.33	0.08	58.55	Realschule + Berufsfachschulabschluss	Realschule + Berufsfachschulabschluss
DE-R1-28	2.8	84	79	5	5	14.05	-0.09	-0.10	54.92	Realschule + Meisterabschluss	Realschule + Meisterabschluss
DE-R2-28	2.8	69	69	5	5	13.90	0.06	-0.10	54.92	Realschule + Meisterabschluss	Realschule + Meisterabschluss
DE-R3-28	1.8	49	47	5	5	14.78	-0.27	-0.10	54.92	Hauptschule + Meisterabschluss	Hauptschule + Meisterabschluss
DE-R4-28	2.8	68	67	5	5	14.02	-0.15	-0.10	54.92	Realschule + Meisterabschluss	Realschule + Meisterabschluss
DE-R1-30	3.0	25	5	3	4	13.20	1.88	0.40	62.32	Fachhochschulreife	Fachhochschulreife
DE-R2-30	3.0	23	3	3	4	15.00	0.68	0.40	62.32	Fachhochschulreife	Fachhochschulreife
DE-R3-30	3.0								62.32	Fachhochschulreife	Fachhochschulreife
DE-R4-30	3.0	25	8	3	4	14.88	-0.44	0.40	62.32	Fachhochschulreife	Fachhochschulreife
DE-R2-31	3.1	1	1	4	5	14.00	-1.20	-0.01	56.77	Fachhochschulreife + Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre	Fachhochschulreife + Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
DE-R3-31	3.1	2	2	4	5	12.00	-0.03	-0.01	56.77	Fachhochschulreife + Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre	Fachhochschulreife + Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre
DE-R1-33	3.3	11	8	4	5	15.00	0.62	-0.01	56.77	Fachhochschulreife + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre	Fachhochschulreife + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre
DE-R2-33	3.3	8	6	4	5	14.00	-0.34	-0.01	56.77	Fachhochschulreife + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre	Fachhochschulreife + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre
DE-R3-33	3.3	18	13	4	5	15.15	-0.03	-0.01	56.77	Fachhochschulreife + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre	Fachhochschulreife + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre
DE-R4-33	3.3	9	8	4	5	14.00	-0.45	-0.01	56.77	Fachhochschulreife + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre	Fachhochschulreife + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre
DE-R1-34	3.4	21	20	4	5	14.00	0.03	0.17	60.36	Fachhochschulreife + Abgeschlossene kaufmännische Lehre	Fachhochschulreife + Abgeschlossene kaufmännische Lehre
DE-R2-34	3.4	23	20	4	5	14.40	-0.13	0.17	60.36	Fachhochschulreife + Abgeschlossene kaufmännische Lehre	Fachhochschulreife + Abgeschlossene kaufmännische Lehre
DE-R3-34	3.4	18	14	4	5	14.29	0.70	0.17	60.36	Fachhochschulreife + Abgeschlossene kaufmännische Lehre	Fachhochschulreife + Abgeschlossene kaufmännische Lehre
DE-R4-34	3.4	26	22	4	5	14.91	0.25	0.17	60.36	Fachhochschulreife + Abgeschlossene kaufmännische Lehre	Fachhochschulreife + Abgeschlossene kaufmännische Lehre
DE-R2-35	3.5	3	3	3	4	16.00	0.23	-0.01	56.77	Fachhochschulreife + Fachschulabschluss	Fachhochschulreife + Fachschulabschluss
DE-R4-35	3.5	4	3	3	4	15.33	0.62	-0.01	56.77	Fachhochschulreife + Fachschulabschluss	Fachhochschulreife + Fachschulabschluss
DE-R1-36	3.6	22	19	4	5	14.68	0.45	0.49	66.44	Fachhochschulreife + Berufsfachschulabschluss	Fachhochschulreife + Berufsfachschulabschluss
DE-R2-36	3.6	28	24	4	5	14.26	0.69	0.49	66.44	Fachhochschulreife + Berufsfachschulabschluss	Fachhochschulreife + Berufsfachschulabschluss
DE-R3-36	3.6	13	13	4	5	15.00	0.49	0.49	66.44	Fachhochschulreife + Berufsfachschulabschluss	Fachhochschulreife + Berufsfachschulabschluss
DE-R4-36	3.6	24	21	4	5	15.24	0.34	0.49	66.44	Fachhochschulreife + Berufsfachschulabschluss	Fachhochschulreife + Berufsfachschulabschluss
DE-R1-37	3.7	18	15	4	5	15.87	0.37	0.45	65.72	Fachhochschulreife + Berufliches Praktikum, Volontariatpracticum	Fachhochschulreife + Berufliches Praktikum, Volontariatpracticum
DE-R2-37	3.7	12	10	4	5	13.30	0.39	0.45	65.72	Fachhochschulreife + Berufliches Praktikum, Volontariatpracticum	Fachhochschulreife + Berufliches Praktikum, Volontariatpracticum

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
DE-R3-37	3.7	15	14	4	5	15.07	0.57	0.45	65.72	Fachhochschulreife + Berufliches Praktikum, Volontariatpracticum	Fachhochschulreife + Berufliches Praktikum, Volontariatpracticum
DE-R4-37	3.7	18	16	4	5	14.19	0.51	0.45	65.72	Fachhochschulreife + Berufliches Praktikum, Volontariatpracticum	Fachhochschulreife + Berufliches Praktikum, Volontariatpracticum
DE-R1-38	3.8	24	24	5	5	15.21	0.35	0.14	59.76	Fachhochschulreife + Meisterabschluss	Fachhochschulreife + Meisterabschluss
DE-R2-38	3.8	23	22	5	5	14.30	-0.12	0.14	59.76	Fachhochschulreife + Meisterabschluss	Fachhochschulreife + Meisterabschluss
DE-R3-38	3.8	5	5	5	5	16.00	0.66	0.14	59.76	Fachhochschulreife + Meisterabschluss	Fachhochschulreife + Meisterabschluss
DE-R4-38	3.8	15	15	5	5	15.07	-0.01	0.14	59.76	Fachhochschulreife + Meisterabschluss	Fachhochschulreife + Meisterabschluss
DE-R2-40	4.0	166	12	3	4	15.75	0.60	0.75	71.11	Abitur	Abitur
DE-R1-40	4.0	136	12	3	4	14.50	1.22	0.75	71.11	Abitur	Abitur
DE-R3-40	4.0	155	20	3	4	15.50	0.61	0.75	71.11	Abitur	Abitur
DE-R4-40	4.0	136	25	3	4	15.83	0.76	0.75	71.11	Abitur	Abitur
DE-R1-41	4.1	2	1	4	5	14.00	1.81	0.63	68.90	Abitur + Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre	Abitur + Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre
DE-R2-41	4.1	3	1	4	5	15.00	-0.43	0.63	68.90	Abitur + Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre	Abitur + Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre
DE-R3-41	4.1	5	3	4	5	16.33	1.68	0.63	68.90	Abitur + Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre	Abitur + Beruflich-betriebliche Anlernzeit mit Abschlusszeugnis, aber keine Lehre
DE-R1-43	4.3	19	15	4	5	15.13	0.86	0.63	68.90	Abitur + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre	Abitur + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre
DE-R2-43	4.3	14	11	4	5	15.64	0.51	0.63	68.90	Abitur + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre	Abitur + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre
DE-R3-43	4.3	26	21	4	5	15.48	0.47	0.63	68.90	Abitur + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre	Abitur + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre
DE-R4-43	4.3	18	14	4	5	16.36	0.57	0.63	68.90	Abitur + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre	Abitur + Abgeschlossene gewerbliche oder landwirtschaftliche Lehre
DE-R1-44	4.4	40	29	4	5	15.24	0.73	0.80	71.80	Abitur + Abgeschlossene kaufmännische Lehre	Abitur + Abgeschlossene kaufmännische Lehre

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
DE-R2-44	4.4	49	40	4	5	15.78	0.92	0.80	71.80	Abitur + Abgeschlossene kaufmännische Lehre	Abitur + Abgeschlossene kaufmännische Lehre
DE-R3-44	4.4	49	42	4	5	16.21	0.83	0.80	71.80	Abitur + Abgeschlossene kaufmännische Lehre	Abitur + Abgeschlossene kaufmännische Lehre
DE-R4-44	4.4	54	47	4	5	15.68	0.75	0.80	71.80	Abitur + Abgeschlossene kaufmännische Lehre	Abitur + Abgeschlossene kaufmännische Lehre
DE-R1-45	4.5	3	1	4	5	12.00	-0.97	0.63	68.90	Abitur + Berufliches Praktikum, Volontariatpracticum	Abitur + Berufliches Praktikum, Volontariatpracticum
DE-R2-45	4.5	1	1	3	4	21.00		0.63	68.90	Abitur + Berufliches Praktikum, Volontariatpracticum	Abitur + Berufliches Praktikum, Volontariatpracticum
DE-R3-45	4.5	6	4	3	4	14.50	1.00	0.63	68.90	Abitur + Berufliches Praktikum, Volontariatpracticum	Abitur + Berufliches Praktikum, Volontariatpracticum
DE-R4-45	4.5	3	1	4	5	14.00	0.19	0.63	68.90	Abitur + Berufliches Praktikum, Volontariatpracticum	Abitur + Berufliches Praktikum, Volontariatpracticum
DE-R1-46	4.6	24	24	4	5	15.29	0.81	0.83	72.29	Abitur + Fachschulabschluss	Abitur + Fachschulabschluss
DE-R2-46	4.6	29	28	4	5	15.04	0.61	0.83	72.29	Abitur + Fachschulabschluss	Abitur + Fachschulabschluss
DE-R3-46	4.6	23	20	4	5	16.20	1.32	0.83	72.29	Abitur + Fachschulabschluss	Abitur + Fachschulabschluss
DE-R4-46	4.6	25	23	4	5	16.30	0.76	0.83	72.29	Abitur + Fachschulabschluss	Abitur + Fachschulabschluss
DE-R1-47	4.7	18	16	4	5	15.27	0.80	0.87	73.00	Abitur + Berufsfachschulabschluss	Abitur + Berufsfachschulabschluss
DE-R2-47	4.7	13	8	4	5	16.38	0.32	0.87	73.00	Abitur + Berufsfachschulabschluss	Abitur + Berufsfachschulabschluss
DE-R3-47	4.7	12	10	4	5	15.60	1.68	0.87	73.00	Abitur + Berufsfachschulabschluss	Abitur + Berufsfachschulabschluss
DE-R4-47	4.7	13	10	4	5	15.70	0.69	0.87	73.00	Abitur + Berufsfachschulabschluss	Abitur + Berufsfachschulabschluss
DE-R1-48	4.8	19	19	5	5	16.79	0.77	0.59	68.18	Abitur + Meisterabschluss	Abitur + Meisterabschluss
DE-R2-48	4.8	17	16	5	5	15.00	0.55	0.59	68.18	Abitur + Meisterabschluss	Abitur + Meisterabschluss
DE-R3-48	4.8	9	9	5	5	16.44	0.34	0.59	68.18	Abitur + Meisterabschluss	Abitur + Meisterabschluss
DE-R4-48	4.8	6	6	5	5	15.50	0.58	0.59	68.18	Abitur + Meisterabschluss	Abitur + Meisterabschluss

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
DE-R1-50	5.0	135	127	5	6	16.17	0.73	0.84	72.38	Fachhochschule	Fachhochschule
DE-R2-50	5.0	156	148	5	6	15.97	0.93	0.84	72.38	Fachhochschule	Fachhochschule
DE-R3-50	5.0	177	163	5	6	15.91	0.93	0.84	72.38	Fachhochschule	Fachhochschule
DE-R4-50	5.0	213	197	5	6	16.31	0.79	0.84	72.38	Fachhochschule	Fachhochschule
DE-R1-60	6.0	92	77	5	6	17.18	1.69	1.47	81.46	Hochschule/Universität: Zwischenprüfung, Vordiplom; Bachelor	Hochschule/Universität: Zwischenprüfung, Vordiplom; Bachelor
DE-R2-60	6.0	94	74	5	6	17.14	1.63	1.47	81.46	Hochschule/Universität: Zwischenprüfung, Vordiplom; Bachelor	Hochschule/Universität: Zwischenprüfung, Vordiplom; Bachelor
DE-R3-60	6.0	87	65	5	5	17.73	1.61	1.47	81.46	Hochschule/Universität: Zwischenprüfung, Vordiplom; Bachelor	Hochschule/Universität: Zwischenprüfung, Vordiplom; Bachelor
DE-R4-60	6.0	130	100	5	5	17.28	1.15	1.47	81.46	Hochschule/Universität: Zwischenprüfung, Vordiplom; Bachelor	Hochschule/Universität: Zwischenprüfung, Vordiplom; Bachelor
DE-R1-70	7.0	267	243	5	7	17.65	1.73	1.73	84.49	Abgeschlossenes Studium an Hochschule, Universität, Akademie, Polytechnikum (Diplom, Magister, Master, Staatsexamen)	Abgeschlossenes Studium an Hochschule, Universität, Akademie, Polytechnikum (Diplom, Magister, Master, Staatsexamen)
DE-R2-70	7.0	249	229	5	7	17.84	1.91	1.73	84.49	Abgeschlossenes Studium an Hochschule, Universität, Akademie, Polytechnikum (Diplom, Magister, Master, Staatsexamen)	Abgeschlossenes Studium an Hochschule, Universität, Akademie, Polytechnikum (Diplom, Magister, Master, Staatsexamen)
DE-R3-70	7.0	235	211	5	7	17.98	1.78	1.73	84.49	Abgeschlossenes Studium an Hochschule, Universität, Akademie, Polytechnikum (Diplom, Magister, Master, Staatsexamen)	Abgeschlossenes Studium an Hochschule, Universität, Akademie, Polytechnikum (Diplom, Magister, Master, Staatsexamen)
DE-R4-70	7.0	261	238	5	7	18.26	1.60	1.73	84.49	Abgeschlossenes Studium an Hochschule, Universität, Akademie, Polytechnikum (Diplom, Magister, Master, Staatsexamen)	Abgeschlossenes Studium an Hochschule, Universität, Akademie, Polytechnikum (Diplom, Magister, Master, Staatsexamen)
DE-R1-80	8.0	33	31	5	7	18.90	2.61	2.74	92.52	Promotion; Habilitation	Promotion; Habilitation
DE-R2-80	8.0	30	27	5	7	18.30	2.81	2.74	92.52	Promotion; Habilitation	Promotion; Habilitation
DE-R3-80	8.0	34	33	5	7	19.26	2.96	2.74	92.52	Promotion; Habilitation	Promotion; Habilitation
DE-R4-80	8.0	46	41	5	7	20.08	2.71	2.74	92.52	Promotion; Habilitation	Promotion; Habilitation

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
DENMARK											
DK-R1-00	0.0	2	2	1	1		-1.99	-2.09	14.16	No school education, no vocational education	Ingen skoleuddannelse, ingen erhvervsuddannelse
DK-R2-00	0.0	13	5	1	1	8.50	-1.62	-2.09	14.16	Ingen skoleuddannelse, ingen erhvervsuddannelse	Ingen skoleuddannelse, ingen erhvervsuddannelse
DK-R3-00	0.0	4	4	1	1	2.75	-2.20	-2.09	14.16	Ingen skoleuddannelse, ingen erhvervsuddannelse	Ingen skoleuddannelse, ingen erhvervsuddannelse
DK-R4-00	0.0	6	3	1	1	4.00	-2.02	-2.09	14.16	Ingen skoleuddannelse, ingen erhvervsuddannelse	Ingen skoleuddannelse, ingen erhvervsuddannelse
DK-R1-01	1.0	18	6	1	1	7.50	-2.74	-2.05	14.71	1.-6. class in school, no vocational education	1.-6. skoleklasse, ingen erhvervsuddannelse
DK-R2-01	1.0	22	10	1	1	6.70	-2.03	-2.05	14.71	1 -6 skoleklasse, ingen erhvervsuddannelse	1.-6. skoleklasse, ingen erhvervs uddannelse
DK-R3-01	1.0	22	13	1	1	5.23	-1.59	-2.05	14.71	1.-6. skoleklasse, ingen erhvervsuddannelse	1.-6. skoleklasse, ingen erhvervsuddannelse
DK-R4-01	1.0	17	6	1	1	6.83	-1.37	-2.05	14.71	1 -6 skoleklasse, ingen erhvervsuddannelse	1.-6. skoleklasse, ingen erhvervsuddannelse
DK-R1-02	2.0	351	219	2	2	8.71	-1.08	-1.36	25.76	7.-10. class in school, no vocational education	7.-10. skoleklasse, ingen erhvervsuddannelse
DK-R2-02	2.0	326	182	2	2	9.12	-1.28	-1.36	25.76	7 -10 skoleklasse, ingen erhvervsuddannelse	7.-10. skoleklasse, ingen erhvervsuddannelse
DK-R3-02	2.0	286	185	2	2	8.33	-1.30	-1.36	25.76	7.-10. skoleklasse, ingen erhvervsuddannelse	7.-10. skoleklasse, ingen erhvervsuddannelse
DK-R4-02	2.0	324	178	2	2	8.02	-1.37	-1.36	25.76	7 -10 skoleklasse, ingen erhvervsuddannelse	7.-10. skoleklasse, ingen erhvervsuddannelse
DK-R2-04	3.0	429	375	3	3	12.96	-0.48	-0.59	45.57	Erhvervsfaglige|håndværker|social|sundhedshjælper	Erhvervsfaglige uddannelser, håndværkeruddannelser, social og sundhedshjælperuddannelser
DK-R3-04	3.0	431	367	3	3	12.56	-0.55	-0.59	45.57	Erhvervsfaglige|håndværker|social|sundhedshjælper	Erhvervsfaglige uddannelser håndværkeruddannelser, social og sundhedshjælperuddannelser
DK-R4-04	3.0	494	443	3	3	11.82	-0.58	-0.59	45.57	Erhvervsfaglige|håndværker|social|sundhedshjælper	Erhvervsfaglige uddannelser, håndværkeruddannelser, social og sundhedshjælperuddannelser
DK-R1-04	3.1	594	516	3	3	13.10	-0.29	-0.33	50.00	Vocational education and training, apprent training a	Erhvervsfaglige uddannelser, håndværkeruddannelser, social og sundhedshjælperuddannelser
DK-R1-05	3.2	32	31	5	5	15.35	0.18	0.18	62.64	Work leader education for vocational educated	Arbejdslederuddannelser for faglærte
DK-R1-03	4.0	103	45	3	4	13.91	0.30	0.05	59.42	Upper secondary school, no vocational education	Gymnasium, HF, HH, HTX, ingen erhvervsuddannelse

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
DK-R2-03	4.0	112	44	3	4	13.68	0.07	0.05	59.42	Gymnasium, HF, HH, HTX, ingen erhvervsuddannelse	Gymnasium, HF, HH, HTX, ingen erhvervsuddannelse
DK-R3-03	4.0	105	45	3	4	13.87	0.01	0.05	59.42	Gymnasium, HF, HH, HTX, ingen erhvervsuddannelse	Gymnasium, HF, HH, HTX, ingen erhvervsuddannelse
DK-R4-03	4.0	119	57	3	4	12.72	-0.11	0.05	59.42	Gymnasium, HF, HH, HTX, ingen erhvervsuddannelse	Gymnasium, HF, HH, HTX, ingen erhvervsuddannelse
DK-R1-06	5.0	137	125	5	5	15.05	0.41	0.29	65.15	Further education of 2-3 years after upper sec school	Videregående uddannelser på 2-3 år efter gymnasium eller faglig uddannelse
DK-R2-05	5.0	191	175	5	5	14.62	0.26	0.29	65.15	Korte videregående uddannelser	Korte videregående uddannelser (efter faglig uddannelse eller (har som oftest en varighed af 2-3 gymnasium) (har som oftest en varighed af 2-3 år, fx socialpædagog maskintekniker, politi)
DK-R3-05	5.0	174	154	5	5	13.91	0.23	0.29	65.15	Korte videregående uddannelser	Korte videregående uddannelser (efter faglig uddannelse eller (har som oftest en varighed af 2-3 gymnasium) (har som oftest en varighed af 2-3 år, fx socialpædagog maskintekniker, politi)
DK-R4-05	5.0	164	146	5	5	14.10	0.23	0.29	65.15	Korte videregående uddannelser	Korte videregående uddannelser (efter faglig uddannelse eller (har som oftest en varighed af 2-3 gymnasium) (har som oftest en varighed af 2-3 år, fx socialpædagog maskintekniker, politi)
DK-R1-07	6.0	149	135	5	6	17.11	1.08	0.94	78.51	Further education of around 4 years after upper sec sc	Videregående uddannelser på ca. 4 år efter gymnasium eller faglig uddannelse
DK-R2-06	6.0	248	228	5	6	15.73	0.81	0.94	78.51	Mellemlang videregående uddannelse	Mellemlang videregående uddannelse (efter faglig uddannelse eller gymnasium) (har som oftest en varighed af 3-4 år, fx teknikumingeniør, lærer, sygeplejerske)
DK-R3-06	6.0	282	250	5	6	15.90	0.81	0.94	78.51	Mellemlang videregående uddannelse	Mellemlang videregående uddannelse (efter faglig uddannelse eller gymnasium) (har som oftest en varighed af 3-4 år, fx teknikumingeniør, lærer, sygeplejerske)
DK-R4-06	6.0	322	304	5	6	15.43	0.92	0.94	78.51	Mellemlang videregående uddannelse	Mellemlang videregående uddannelse (efter faglig uddannelse eller gymnasium) (har som oftest en varighed af 3-4 år, fx teknikumingeniør, lærer, sygeplejerske)
DK-R1-08	7.0	98	85	5	7	18.68	2.13	1.84	90.10	Bachelors or masters degree from university	Bachelor eller kandidateksamen fra universitet
DK-R2-07	7.0	129	117	5	7	17.82	1.65	1.84	90.10	Lang videregående uddannelse [Universitetsuddannelser fx]	Lang videregående uddannelse (efter faglig uddannelse eller gymnasium) (Universitetsuddannelser fx cand.jur., læge, cand.merc., arkitektskolerne, musikkonservatorierne)
DK-R3-07	7.0	160	141	5	7	18.68	1.59	1.84	90.10	Lang videregående uddannelse [Universitetsuddannelser fx]	Lang videregående uddannelse (efter faglig uddannelse eller gymnasium) (Universitetsuddannelser fx cand.jur., læge, cand.merc., arkitektskolerne, musikkonservatorierne)
DK-R4-07	7.0	146	130	5	7	17.83	1.61	1.84	90.10	Lang videregående uddannelse [Universitetsuddannelser fx]	Lang videregående uddannelse (efter faglig uddannelse eller gymnasium) (Universitetsuddannelser fx cand.jur., læge, cand.merc., arkitektskolerne, musikkonservatorierne)
DK-R1-09	8.0	10	9	5	7	20.57	2.53	2.26	93.32	Further university education i.e. ph.d.	Overbygning på universitetseksamen, Ph.d., licentiat

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
DK-R2-08	8.0	11	11	5	7	19.27	1.87	2.26	93.32	University degree; PhD/Uniabschl.; Doktortitel	Overbygning på universitetseksamen, Ph.d., licentiat
DK-R3-08	8.0	16	13	5	7	20.31	1.98	2.26	93.32	Overbygning på universitetseksamen, Ph.d., licentiat	Overbygning på universitetseksamen, Ph.d., licentiat
DK-R4-08	8.0	8	8	5	7	21.57	2.13	2.26	93.32	Overbygning på universitetseksamen, Ph.d., licentiat	Overbygning på universitetseksamen, Ph.d., licentiat
ESTONIA											
EE-R3-01	1.0	544	292	2	3	10.23	-0.67	-0.77	37.71	No qualifications	Ei oma kutse-, ameti- ega erialaharidust
EE-R2-02	1.1	20	10	1	1	3.50	-1.97	-2.23	16.11	No primary education, illiterate	Kirjaoskamatu
EE-R4-02	1.2	76	22	1	1	6.52	-1.50	-1.70	22.71	Basic education without professional qualifications	Algahariduseta
EE-R4-03	1.3	208	91	2	2	8.59	-1.17	-1.32	26.05	Primary ed without prof qual or uncompl secondary ed without prof qual	Algharidus / Põhiharidus (mittetäielik keskharidus)
EE-R2-03	1.3	131	33	1	1	5.58	-1.79	-2.03	18.36	Primary education	Algahariduseta / Algharidus
EE-R2-04	1.3	347	161	2	2	8.17	-1.28	-1.46	26.43	General basic education [incomplete secondary education]	Põhiharidus (mittetäielik keskharidus)
EE-R2-05	1.4	344	244	3	4	11.52	-0.16	-0.29	48.10	General secondary education	Keskharidus
EE-R4-04	1.4	229	156	3	4	11.58	-0.38	-0.29	48.10	Secondary education without professional qualifications	Keskharidus
EE-R2-07	2.0	22	10	2	2	9.80	-1.35	-1.13	31.94	Vocational basic education	Kutseharidus koos põhihariduse omandamisega
EE-R3-03	2.0	50	31	2	2	9.26	-1.22	-1.13	31.94	Vocational education with acquisition of basic education	Kutseharidus koos põhihariduse omandamisega
EE-R4-07	2.0	45	35	2	2	10.17	-0.70	-1.13	31.94	Vocational education with acquisition of basic education	Kutseharidus koos põhihariduse omandamisega
EE-R2-08	3.0	281	236	3	3	10.98	-0.53	-0.61	42.54	Vocational secondary education	Kutseharidus koos keskhariduse omandamisega / Kutsekeskharidus põhihariduse baasil / Kutseharidus, õppeaeg alla 3 aasta/Kutseharidus, õppeaeg 3 aastat või rohkem
EE-R3-02	3.1	78	61	2	2	10.22	-0.86	-0.98	40.30	Vocational education, 3 year study	Kutseharidus, õppeaeg alla 3 aasta/Kutseharidus, õppeaeg 3 aastat või rohkem
EE-R4-05	3.1	83	70	2	2	10.90	-0.56	-0.64	41.10	Vocational education, less than 3 years studies	Kutseharidus, õppeaeg alla 3 aasta

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
EE-R4-06	3.1	32	26	2	2	12.69	-0.07	-0.09	52.15	Vocational education with 3 or more years study	Kutseharidus, õppeaeg 3 aastat või rohkem
EE-R3-04	3.2	98	82	3	3	11.52	-0.47	-0.44	45.10	Vocational education with secondary education	Kutseharidus koos keskhariduse omandamisega
EE-R4-08	3.2	92	82	3	3	12.04	-0.29	-0.44	45.10	Vocational education with acquisition of secondary education	Kutseharidus koos keskhariduse omandamisega
EE-R3-05	3.3	81	70	3	3	11.20	-0.50	-0.52	43.53	Vocational education after acquisition of basic education	Kutsekeskharidus põhihariduse baasil
EE-R4-09	3.3	94	72	3	3	11.63	-0.41	-0.52	43.53	Vocational-secondary education after acquisition of basic education	Kutsekeskharidus põhihariduse baasil
EE-R2-09	4.0	127	112	4	5	12.75	-0.22	-0.35	46.80	Vocational secondary education after secondary education	Kutsekeskharidus keskhariduse baasil
EE-R3-06	4.0	59	48	4	5	12.96	-0.34	-0.35	46.80	Vocational education after secondary education	Kutsekeskharidus keskhariduse baasil
EE-R4-10	4.0	95	77	4	5	12.58	-0.41	-0.35	46.80	Vocational-seconadary education after secondary education	Kutsekeskharidus keskhariduse baasil
EE-R2-10	5.0	183	163	3	4	12.42	-0.15	-0.37	46.47	Professional secondary|technical education after basic educa	Keskeri-/tehnikumiharidus pärast põhiharidust
EE-R3-07	5.0	136	118	3	4	12.08	-0.32	-0.37	46.47	Vocational secondary/technical scool after basic education	Keskeri-/tehnikumiharidus pärast põhiharidust
EE-R4-11	5.0	181	158	3	4	12.48	-0.50	-0.37	46.47	Vocational secondary-technical scool after basic education	Keskeri-/tehnikumiharidus pärast põhiharidust
EE-R2-11	6.0	198	180	5	5	14.31	0.37	0.28	59.53	Professional secondary|technical education after secondary e	Keskeri-/tehnikumiharidus pärast keskharidust
EE-R3-08	6.0	150	137	5	5	13.82	0.04	0.28	59.53	Vocational secondary/technical scool after seconda education	Keskeri-/tehnikumiharidus pärast keskharidust
EE-R4-12	6.0	163	149	5	5	13.60	0.30	0.28	59.53	Vocational secondary-technical scool after secondary education	Keskeri-/tehnikumiharidus pärast keskharidust
EE-R2-12	7.0	308	281	5	6	16.68	1.45	1.62	80.09	Higher education	Kutsekõrgharidus / Rakenduskõrgharidus (diplomiõpe) / Bakalaureus (kõrgharidus)
EE-R3-09	7.1	50	37	5	6	16.16	1.38	1.38	78.26	Higher vocational education	Kutsekõrgharidus
EE-R4-13	7.1	54	48	5	6	15.30	1.12	1.38	78.26	Vocational higher education	Kutsekõrgharidus
EE-R3-10	7.2	58	49	5	5	15.96	1.19	1.29	77.03	Professional higher education (diploma study)	Rakenduskõrgharidus (diplomiõpe)
EE-R4-14	7.2	50	46	5	6	16.46	1.11	1.29	77.03	Applied higher education [diploma study]	Rakenduskõrgharidus (diplomiõpe)

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
EE-R3-11	7.3	166	147	5	6	16.46	1.48	1.66	80.24	Higher education	Bakalaureus (kõrgharidus)
EE-R4-15	7.3	50	36	5	6	16.75	0.95	1.06	73.48	Bachelor, 3 years studies [Higher education]	Bakalaureus 3 aastat (kõrgharidus)
EE-R4-16	7.3	104	92	5	6	16.97	1.33	1.49	79.77	Bachelor, more than 3 year studies	Bakalaureus rohkem kui 3 aastat
EE-R2-13	8.0	23	21	5	7	17.90	2.76	2.62	86.05	Master's degree	Magister
EE-R3-12	8.0	38	34	5	7	18.09	2.07	2.62	86.05	Degree study	Magister
EE-R4-17	8.1	57	57	5	7	17.42	1.54	1.73	82.69	2 years Master studies	Magister 2 aasta
EE-R4-18	8.2	30	25	5	7	17.36	1.32	1.48	79.62	Scientific degree of Master	Teadusmagister
EE-R3-13	9.0	9	8	5	7	18.38	2.28	2.75	91.67	Doctoral study	Teaduste kandidaat/doktor
EE-R4-19	9.0	5	2	5	7	22.50	3.13	2.75	91.67	Phd, doctor, all other scientific degrees higher than scientific degree of master	Teaduste kandidaat/doktor, muu teaduskraad, mis on magistrist kõrgem
SPAIN											
ES-R1-00	0.0	112	67	1	1	0.17	-1.42	-0.86	20.88	No studies-illiterate	Sin estudios/analfabeto
ES-R2-00	0.0	221	167	1	1	7.38	-0.57	-0.86	20.88	No schooling - illiterate	Sin estudios/analfabeto
ES-R3-00	0.0	58	31	1	1	0.79	-1.08	-0.86	20.88	No schooling | illiterate	Sin estudios/analfabeto
ES-R4-00	0.0	114	46	1	1	0.79	-1.09	-0.86	20.88	No schooling / illiterate	Sin estudios/analfabeto
ES-R1-01	1.0	246	167	1	1	4.39	-1.20	-1.10	16.26	Not completed primary education	Estudios primarios sin terminar (menos de 5 años de escuela o E.G.B.)
ES-R2-01	1.0	132	84	1	1	4.92	-1.35	-1.10	16.26	Not completed primary education	Estudios primarios sin terminar
ES-R3-01	1.0	220	135	1	1	5.02	-1.01	-1.10	16.26	Not completed primary education	Estudios primarios sin terminar
ES-R4-01	1.0	244	144	1	1	4.57	-1.04	-1.10	16.26	Not completed primary education	Estudios primarios sin terminar

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
ES-R1-02	2.0	321	269	1	1	7.57	-0.78	-0.75	21.84	Primary education	Estudios primarios completos (incluido 5º E.G.B.)
ES-R2-03	2.1	8	6	1	1	6.67	-1.14	-0.92	19.60	Five years of General Basic Education	Antigua primaria completa
ES-R3-03	2.1	64	50	1	1	8.66	-0.92	-0.92	19.60	Five years of General Basic Education	Antigua primaria completa
ES-R4-03	2.1	49	43	1	1	6.49	-0.95	-0.92	19.60	Five years of General Basic Education	Antigua primaria completa
ES-R2-02	2.2	119	100	1	1	8.06	-0.94	-0.91	19.79	General Basic Education, no Graduate	Certificado de escolaridad
ES-R3-02	2.2	113	85	1	1	8.41	-0.90	-0.91	19.79	General Basic Education, no Graduate	Certificado de escolaridad
ES-R4-02	2.2	199	156	1	1	6.93	-0.96	-0.91	19.79	General Basic Education, no Graduate	Certificado de escolaridad
ES-R2-04	2.3	153	125	1	1	8.03	-0.84	-0.76	22.96	Former primary education [5 years]	Hasta 5º de EGB
ES-R3-04	2.3	200	160	1	1	8.56	-0.81	-0.76	22.96	Former primary education (5 years)	Hasta 5º de EGB
ES-R4-04	2.3	283	240	1	1	8.42	-0.75	-0.76	22.96	Former primary education [5 years]	Hasta 5º de EGB
ES-R1-03	3.0	331	249	2	2	9.04	-0.39	-0.38	30.04	Degree of primary education	EGB, ESO o equivalente (antiguo Bachillerato elemental, graduado escolar, certificado escolar.)
ES-R2-05	3.1	256	166	2	2	8.56	-0.59	-0.57	27.62	General Basic or Compulsory Secondary Education, Graduate	EGB o ESO
ES-R3-05	3.1	322	210	2	2	9.94	-0.67	-0.57	27.62	General Basic or Compulsory Secondary Education, Graduate	EGB o ESO
ES-R4-05	3.1	516	367	2	2	9.56	-0.55	-0.57	27.62	General Basic or Compulsory Secondary Education, Graduate	EGB o ESO
ES-R2-06	3.2	86	63	2	2	10.82	-0.17	-0.29	35.53	Former lower secondary education	Bachillerato elemental
ES-R3-06	3.2	69	58	2	2	10.88	-0.39	-0.29	35.53	Former lower secondary education	Bachillerato elemental
ES-R4-06	3.2	115	99	2	2	10.70	-0.33	-0.29	35.53	Former lower secondary education	Bachillerato elemental
ES-R1-04	4.0	125	96	3	3	12.04	0.30	-0.05	42.88	Vocational education, first cycle	FP1 y Enseñanza técnico-profesional o equiv.
ES-R2-07	4.0	53	43	3	3	12.12	-0.06	-0.05	42.88	Vocational training I	FP1 y Enseñanza Técnico Profesional o equivalente

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
ES-R3-07	4.0	99	80	3	3	12.53	-0.39	-0.05	42.88	Vocational training I	FP1 y Enseñanza Técnico Profesional o equivalente
ES-R4-07	4.0	115	93	3	3	12.52	-0.11	-0.05	42.88	Vocational training I	FP1 y Enseñanza Técnico Profesional o equivalente
ES-R1-06	5.0	110	87	4	5	14.08	0.33	0.30	53.92	Vocational education, second cycle	FP2 o equivalente
ES-R2-09	5.0	117	96	4	5	14.08	0.36	0.30	53.92	Vocational training II	FP2 o equivalente
ES-R3-09	5.0	163	137	4	5	14.95	0.22	0.30	53.92	Vocational training II	FP2 o equivalente
ES-R4-09	5.0	188	162	4	5	14.39	0.34	0.30	53.92	Vocational training II	FP2 o equivalente
ES-R1-05	6.0	215	149	3	4	12.92	0.59	0.46	58.95	Secondary education	Bachillerato superior, BUP, o equivalente
ES-R2-08	6.0	160	99	3	4	13.13	0.39	0.46	58.95	Higher secondary education	Bachillerato superior, BUP o equivalente
ES-R3-08	6.0	216	154	3	4	13.79	0.64	0.46	58.95	Higher secondary education	Bachillerato superior, BUP o equivalente
ES-R4-08	6.0	342	233	3	4	13.07	0.32	0.46	58.95	Former higher secondary education	Bachillerato superior, BUP o equivalente
ES-R1-07	7.0	11	8	5	5	15.75	0.93	1.14	77.49	2 or 3 years higher education [not leading to a uni	Estudios superiores 2 o 3 años (en centros de estudio no reglados)
ES-R2-10	7.0	17	13	5	5	15.46	1.73	1.14	77.49	Post-secondary, non tertiary	Estudios superiores de 2 o 3 años (en centros de estudios no reglados)
ES-R3-10	7.0	22	15	5	5	16.21	1.03	1.14	77.49	Post-secondary, non tertiary	Estudios superiores de 2 o 3 años (en centros de estudios no reglados)
ES-R4-10	7.0	6	5	5	5	14.80	0.52	1.14	77.49	Post secondary, non-tertiary	Estudios superiores de 2 o 3 años (en centros de estudios no reglados)
ES-R1-09	8.0	24	21	5	6	17.05	1.71	1.06	75.65	Other short cycle university degree [3 years]	Diplomado de otras escuelas universitarias o equivalente
ES-R2-12	8.0	108	96	5	6	16.74	0.86	1.06	75.65	University degree, 3 years	Diplomado de otras escuelas universitarias o equivalente
ES-R3-12	8.0	110	99	5	6	18.14	0.91	1.06	75.65	University degree, 3 years	Diplomado de otras escuelas universitarias o equivalente
ES-R4-12	8.0	161	138	5	6	17.35	1.28	1.06	75.65	University degree, 3 years	Diplomado de otras escuelas universitarias o equivalente
ES-R1-08	9.0	85	71	5	6	16.08	1.27	1.24	79.77	Polytechnical studies, short cycle: techni arch or	Arquitecto e Ingeniero Técnico

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
ES-R2-11	9.0	18	14	5	6	18.21	0.88	1.24	79.77	University degree, 3 years technical	Arquitecto e Ingeniero Técnico
ES-R3-11	9.0	15	12	5	6	17.17	1.56	1.24	79.77	University degree, 3 years technical	Arquitecto e Ingeniero Técnico
ES-R4-11	9.0	13	11	5	6	18.09	1.54	1.24	79.77	University degree, 3 years technical	Arquitecto e Ingeniero Técnico
ES-R1-11	10.0	111	96	5	7	18.67	2.27	2.04	91.69	Other long cycle university degree [5 yrs or more]	Licenciado
ES-R2-14	10.0	145	127	5	7	18.46	1.95	2.04	91.69	University degree, 5 years	Licenciado
ES-R3-14	10.0	149	139	5	7	18.65	1.88	2.04	91.69	University degree, 5 years	Licenciado
ES-R4-14	10.0	180	167	5	7	19.41	2.31	2.04	91.69	University degree, 5 years	Licenciado
ES-R1-10	11.0	11	10	5	7	18.50	3.80	2.49	95.17	Polytechnical studies, long cycle: arch, engnr 5 yr	Arquitecto o ingeniero superior
ES-R2-13	11.0	17	15	5	7	19.43	2.09	2.49	95.17	University degree, 5 years technical	Arquitecto o Ingeniero Superior
ES-R3-13	11.0	14	14	5	7	19.50	2.11	2.49	95.17	University degree, 5 years technical	Arquitecto o Ingeniero Superior
ES-R4-13	11.0	19	18	5	7	19.89	2.63	2.49	95.17	University degree, 5 years technical	Arquitecto o Ingeniero Superior
ES-R1-12	12.0	10	8	5	7	19.29	3.13	2.56	95.55	Postgraduate degree	Estudios postgrado o especialización
ES-R2-15	12.0	9	9	5	7	20.57	2.40	2.56	95.55	Postgraduate studies	Estudios de postgrado o especialización
ES-R3-15	12.0	22	22	5	7	19.95	2.31	2.56	95.55	Postgraduate studies	Estudios de postgrado o especialización
ES-R4-15	12.0	15	15	5	7	19.93	2.99	2.56	95.55	Postgraduate studies	Estudios de postgrado o especialización
ES-R1-13	13.0	10	9	5	7	22.00	2.46	2.17	92.90	Doctoral degree	Doctorado
ES-R2-16	13.0	9	8	5	7	18.88	2.74	2.17	92.90	PhD	Doctorado
ES-R3-16	13.0	14	13	5	7	21.17	1.82	2.17	92.90	Ph.D.	Doctorado
ES-R4-16	13.0	15	14	5	7	20.29	2.17	2.17	92.90	Ph D	Doctorado

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
FINLAND											
FI-R1-00	0.0	35	15	1		6.40	-1.56	-1.72	18.85	Incomplete primary	Vähemmän kuin peruskoulun alaaste tai kansakoulu
FI-R2-00	0.0	35	8	1		6.13	-1.43	-1.72	18.85	Incomplete primary	Vähemmän kuin peruskoulun alaaste tai kansakoulu
FI-R3-00	0.0	67	26	1		6.65	-1.61	-1.72	18.85	Incomplete primary	Vähemmän kuin peruskoulun alaaste tai kansakoulu
FI-R4-00	0.0	32	12	1		6.33	-1.41	-1.72	18.85	No education	Vähemmän kuin peruskoulun alaaste tai kansakoulu
FI-R1-01	1.0	376	278	1		7.84	-1.18	-1.50	22.34	Primary	Peruskoulun ala-aste (1-6 luokat), kansakoulu
FI-R2-01	1.0	373	255	1		7.91	-1.32	-1.50	22.34	Primary	Peruskoulun ala-aste (1-6 luokat), kansakoulu
FI-R3-01	1.0	315	206	1		7.98	-1.37	-1.50	22.34	Primary	Peruskoulun ala-aste (1-6 luokat), kansakoulu
FI-R4-01	1.0	330	206	1		8.33	-1.54	-1.50	22.34	Incomplete primary	Peruskoulun ala-aste (1-6 luokat), kansakoulu
FI-R1-02	2.0	388	241	2		9.81	-0.60	-0.74	37.47	Lower secondary	Peruskoulun yläaste (7-9/10 luokat), keskikoulu
FI-R2-02	2.0	327	200	2		9.95	-0.59	-0.74	37.47	Lower secondary	Peruskoulun yläaste (7-9/10 luokat), keskikoulu
FI-R3-02	2.0	273	165	2		9.82	-0.65	-0.74	37.47	Lower secondary	Peruskoulun yläaste (7-9/10 luokat), keskikoulu
FI-R4-02	2.0	330	185	2		10.01	-0.84	-0.74	37.47	Complete primary	Peruskoulun yläaste (7-9/10 luokat), keskikoulu
FI-R1-03	3.0	697	494	3		12.48	-0.02	-0.20	50.51	Upper secondary	Lukio, ylioppilas- tai ammatillinen tutkinto
FI-R2-03	3.0	714	530	3		12.57	-0.17	-0.20	50.51	Upper secondary	Lukio, ylioppilas- tai ammatillinen tutkinto
FI-R3-03	3.0	670	492	3		12.69	-0.23	-0.20	50.51	Upper secondary	Lukio, ylioppilas- tai ammatillinen tutkinto
FI-R4-03	3.0	830	632	3		12.81	-0.24	-0.20	50.51	Lower secondary	Lukio, ylioppilas- tai ammatillinen tutkinto
FI-R1-05	4.0	482	439	5		16.16	1.10	1.11	78.42	Tertiary	Opisto- tai korkeakoulututkinto
FI-R2-05	4.0	543	507	5		16.23	0.97	1.11	78.42	Tertiary	Opisto- tai korkeakoulututkinto

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
FI-R3-05	4.0	538	501	5		16.39	0.97	1.11	78.42	Tertiary	Opisto- tai korkeakoulututkinto
FI-R4-05	4.0	631	580	5		16.73	1.00	1.11	78.42	Tertiary, first degree	Opisto- tai korkeakoulututkinto
FI-R1-06	5.0	15	15	5		20.87	2.49	2.65	94.21	Tertiary second stage	Lisensiaatin tai tohtorin tutkinto
FI-R2-06	5.0	29	29	5		20.21	2.71	2.65	94.21	Tertiary second stage	Lisensiaatin tai tohtorin tutkinto
FI-R3-06	5.0	31	29	5		19.04	2.54	2.65	94.21	Tertiary second stage	Lisensiaatin tai tohtorin tutkinto
FI-R4-06	5.0	41	38	5		19.83	2.01	2.65	94.21	Tertiary, second degree	Lisensiaatin tai tohtorin tutkinto
FRANCE											
FR-R1-01	1.0	133	100	1		7.69	-1.23	-1.32	22.40	Sans diplome	SANS DIPLOME
FR-R2-01	1.0	146	108	1		6.46	-1.36	-1.32	22.40	Not completed primary education	SANS DIPLOME
FR-R3-01	1.0	166	115	1	1	7.82	-1.41	-1.32	22.40	Sans diplôme	SANS DIPLOME
FR-R4-01	1.1	7	7	1	1	1.14	-1.96	-1.92	14.49	Non scolarisé	NON SCOLARISE
FR-R4-02	1.2	99	57	1	1	7.00	-1.65	-1.62	18.47	Ecole primaire uniquement	ECOLE PRIMAIRE UNIQUEMENT
FR-R1-04	2.0	191	127	1		7.60	-0.98	-1.09	27.55	Certificat d'études primaires	CERTIFICAT D'ETUDES PRIMAIRES
FR-R2-04	2.0	231	162	1		7.37	-1.19	-1.09	27.55	Certificat d'études primaires	CERTIFICAT D'ETUDES PRIMAIRES
FR-R3-04	2.0	194	139	1	1	8.22	-0.98	-1.09	27.55	Certificat d'études primaires	CERTIFICAT D'ETUDES PRIMAIRES
FR-R4-03	2.0	214	127	1	1	7.98	-1.27	-1.09	27.55	Certificat d'études primaires	CERTIFICAT D'ETUDES PRIMAIRES
FR-R1-02	3.0	57	42	2		9.55	-0.45	-0.64	36.32	Non diplômés jusqu'à la fin 3éme, 2nde, 1re filière générale	NON DIPLOMES JUSQU'A LA FIN 3EME, 2ND, 1ERE FILIERE GENERALE
FR-R2-02	3.0	60	42	2		10.07	-0.89	-0.64	36.32	Non diplômés jusqu'à la fin 3éme, 2nde, 1re filière générale	NON DIPLOMES JUSQU'A LA FIN 3EME, 2ND, 1ERE FILIERE GENERALE
FR-R3-02	3.0	80	57	2	2	10.12	-0.62	-0.64	36.32	Non diplômés jusqu'à la fin 3éme, 2nde, 1re filière générale	NON DIPLOMES JUSQU'A LA FIN 3EME, 2ND, 1ERE FILIERE GENERALE

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
FR-R4-04	3.1	68	50	1	1	9.55	-1.14	-1.12	27.05	Non diplômés jusqu'à la fin 3ème	NON DIPLOME JUSQU'A LA FIN 3EME
FR-R4-05	3.2	59	33	2	2	12.00	-0.15	-0.15	48.78	Non diplômés du 2nd cycle [2nde, 1re filière générale]	NON DIPLOME DU 2ND CYCLE (2NDE, 1ERE FILIERE GENERALE)
FR-R1-03	4.0	67	57	2		10.43	-0.76	-0.71	35.58	Non diplômés du CAP BEP filière professionnelle	NON DIPLOMES DU CAP BEP FILIERE PROFESSIONNELLE
FR-R2-03	4.0	62	52	2		9.94	-0.72	-0.71	35.58	Non diplômés du CAP BEP filière professionnelle	NON DIPLOMES DU CAP BEP FILIERE PROFESSIONNELLE
FR-R3-03	4.0	57	47	2	2	10.64	-0.63	-0.71	35.58	Non diplômésdu CAP BEP filière professionnelle	NON DIPLOMES DU CAP BEP FILIERE PROFESSIONNELLE
FR-R4-06	4.0	161	134	2	2	10.54	-0.73	-0.71	35.58	Non diplômés du CAP, BEP, filière professionnelle	NON DIPLOME DU CAP, BEP, FILIERE PROFESSIONNELLE
FR-R1-05	5.0	186	167	3		10.05	-0.72	-0.71	35.06	CAP, examen de fin d apprentissage artisanal	CAP, EXAMEN DE FIN D'APPRENTISSAGE ARTISANAL
FR-R2-05	5.0	246	227	3		9.96	-0.62	-0.71	35.06	CAP, examen de fin d'apprentissage artisanal	CAP, EXAMEN DE FIN D'APPRENTISSAGE ARTISANAL
FR-R3-05	5.0	263	239	3	3	10.68	-0.84	-0.71	35.06	CAP, examen de fin d'apprentissage artisanal	CAP, EXAMEN DE FIN D'APPRENTISSAGE ARTISANAL
FR-R4-08	5.1	375	325	3	3	11.13	-0.76	-0.75	34.62	CAP, examen de fin d apprentissage artisanal, BEP, BP	CAP, EXAMEN DE FIN D'APPRENTISSAGE ARTISANAL, BEP, BP
FR-R4-09	5.2	22	22	3	3	11.64	-0.90	-0.89	31.72	Diplôme d aide soignante, auxiliaire de puériculture, aide m	DIPLOME D'AIDE SOIGNANTE, AUXILIAIRE DE PUERICULTURE, AIDE MEDICO PEDAGOGIQUE, AIDE A DOMICILE
FR-R1-06	6.0	143	116	3		11.54	-0.33	-0.34	44.16	BEP, BP, BEA, BEC, BEI, BES	BEP, BP, BEA, BEC, BEI, BES
FR-R2-06	6.0	176	142	3		11.00	-0.18	-0.34	44.16	BEP, BP, BEA, BEC, BEI, BES	BEP, BP, BEA, BEC, BEI, BES
FR-R3-06	6.0	227	201	3	3	12.01	-0.47	-0.34	44.16	BEP, BP, BEA, BEC, BEI, BES	BEP, BP, BEA, BEC, BEI, BES
FR-R1-07	7.0	76	50	2		10.82	-0.18	-0.33	44.35	Brevet élementaire, brevet d'étude du premier cycle, brevet	BREVET ELEMENTAIRE, BREVET D'ETUDE DU PREMIER CYCLE, BREVET DES COLLEGES
FR-R2-07	7.0	129	93	2		9.80	-0.30	-0.33	44.35	Brevet élementaire, brevet d'étude du premier cycle, brevet	BREVET ELEMENTAIRE, BREVET D'ETUDE DU PREMIER CYCLE, BREVET DES COLLEGES
FR-R3-07	7.0	115	57	2	2	11.18	-0.43	-0.33	44.35	Brevet élementaire, brevet d'étude du premier cycle, brevet	BREVET ELEMENTAIRE, BREVET D'ETUDE DU PREMIER CYCLE, BREVET DES COLLEGES
FR-R4-07	7.0	95	51	2	2	10.08	-0.45	-0.33	44.35	Brevet élementaire, brevet d'étude du premier cycle, brevet	BREVET ELEMENTAIRE, BREVET D'ETUDE DU PREMIER CYCLE, BREVET DES COLLEGES

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
FR-R1-09	8.0	93	73	3		13.33	0.11	0.07	53.14	Brevet de technicien, bac de technicien, baccalaur,	BREVET DE TECHNICIEN, BACCALAUREAT DE TECHNICIEN, BACCALAUREAT TECHNOLOGIQUE, BACCALAUREAT PROFESSIONNEL
FR-R2-09	8.0	113	83	3		12.55	0.02	0.07	53.14	Brevet de technicien, baccalauréat de technicien, baccalauré	BREVET DE TECHNICIEN, BACCALAUREAT DE TECHNICIEN, BACCALAUREAT TECHNOLOGIQUE, BEA, BEC, BEI, BES
FR-R3-09	8.0	156	123	3	4	13.69	0.07	0.07	53.14	Brevet de technicien, baccalauréat de technicien, baccalauré	BREVET DE TECHNICIEN, BACCALAUREAT DE TECHNICIEN, BACCALAUREAT TECHNOLOGIQUE, BEA, BEC, BEI, BES
FR-R4-13	8.1	5	4	4	4	16.50	-0.08	-0.07	50.54	Diplôme de moniteur-éducateur, éducateur technique spécialisé	DIPLOME DE MONITEUR-EDUCATEUR, EDUCATEUR TECHNIQUE SPECIALISE
FR-R4-11	8.2	86	70	3	4	13.84	0.14	0.14	55.75	Brevet de technicien, baccalauréat de technicien, baccalauré	BREVET DE TECHNICIEN, BACCALAUREAT DE TECHNICIEN, BACCALAUREAT TECHNOLOGIQUE, BEA, BEC, BEI, BES
FR-R4-12	8.3	85	70	3	4	13.63	-0.21	-0.20	47.38	Baccalauréat professionnel	BACCALAUREAT PROFESSIONNEL
FR-R1-08	9.0	165	114	3		13.12	0.23	0.37	61.04	Baccalauréat général, brevet supérieur	BACCALAUREAT GENERAL, BREVET SUPERIEUR
FR-R2-08	9.0	182	142	3		12.50	0.52	0.37	61.04	Baccalauréat général, brevet supérieur	BACCALAUREAT GENERAL, BREVET SUPERIEUR
FR-R3-08	9.0	203	155	3	4	13.14	0.41	0.37	61.04	Baccalauréat général, brevet supérieur	BACCALAUREAT GENERAL, BREVET SUPERIEUR
FR-R4-10	9.0	158	116	3	4	13.39	0.26	0.37	61.04	Baccalauréat général, brevet supérieur	BACCALAUREAT GENERAL, BREVET SUPERIEUR
FR-R1-10	10.0	155	120	5		14.90	0.70	0.79	69.53	Diplôme univer du premier cycle [DEUG], diplôme unive	DIPLOME UNIVERSITAIRES DU PREMIER CYCLE (DEUG), DIPLOME UNIVERSITAIRE DE TECHNOLOGIE (DUT), BREVET DE TECHNICIEN SUPERIEUR (BTS), CERTIFICAT D'APTITUDE PEDAGOGIQUE
FR-R2-10	10.0	204	163	5		15.02	0.97	0.79	69.53	Diplôme universitaire du premier cycle [DEUG], diplôme unive	DIPLOME UNIVERSITAIRES DU PREMIER CYCLE (DEUG), DIPLOME UNIVERSITAIRE DE TECHNOLOGIE (DUT), BREVET DE TECHNICIEN SUPERIEUR (BTS), CERTIFICAT D'APTITUDE PEDAGOGIQUE
FR-R3-10	10.0	241	220	5	5	15.45	0.72	0.79	69.53	Diplôme universitaire du premier cycle (DEUG, nouvelle licence)	DIPLOME UNIVERSITAIRES DU PREMIER CYCLE (DEUG), DIPLOME UNIVERSITAIRE DE TECHNOLOGIE (DUT), BREVET DE TECHNICIEN SUPERIEUR (BTS), CERTIFICAT D'APTITUDE PEDAGOGIQUE
FR-R4-15	10.1	255	217	5	5	15.42	0.71	0.70	68.35	Diplôme universitaire de premier cycle [DEUG], diplôme unive	DIPLOME UNIVERSITAIRES DU PREMIER CYCLE (DEUG), DIPLOME UNIVERSITAIRE DE TECHNOLOGIE (DUT), BREVET DE TECHNICIEN SUPERIEUR (BTS), CERTIFICAT D'APTITUDE PEDAGOGIQUE (INSTITUTEUR), DIPLOME D'EDUCATEUR SPECIALISE,
FR-R4-14	10.2	8	6	4	4	14.67	0.05	0.06	53.69	Diplôme de la capacité en droit, diplôme d accès aux études	DIPLOME DE LA CAPACITE EN DROIT, DIPLOME D'ACCES AUX ETUDES UNIVERSITAIRES (DAEU)
FR-R1-11	11.0	236	194	5		17.36	1.85	1.72	85.56	Diplôme univer des deuxième et troisième cycles, Doct	DIPLOME UNIVERSITAIRE DES DEUXIEME ET TROISIEME CYCLES, DOCTORAT, CAPES, AGREGATION, DIPLOME DE GRANDES ECOLES

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
FR-R2-11	11.0	254	224	5		17.27	1.66	1.72	85.56	Diplôme univer des deuxième et troisième cycles, Doct	DIPLOME UNIVERSITAIRE DES DEUXIEME ET TROISIEME CYCLES, DOCTORAT, CAPES, AGREGATION, DIPLOME DE GRANDES ECOLES
FR-R3-11	11.1	176	151	5	6	17.38	1.59	1.57	83.03	Dipl. univ. du deuxième cycle, CAPES, Diplôme des grandes écoles	DIPLOME UNIVERSITAIRE DES DEUXIEME ET TROISIEME CYCLES, DOCTORAT, CAPES, AGREGATION, DIPLOME DE GRANDES ECOLES
FR-R4-16	11.1	186	152	5	6	16.98	1.26	1.24	78.54	Diplôme universitaire de deuxième cycle [licence, maîtrise]	DIPLOME UNIVERSITAIRE DU DEUXIEME CYCLE (LICENCE, MAITRISE, MASTER PREMIERE ANNEE), CAPES, CRPE (PROFESSEUR DES ECOLES)
FR-R4-18	11.1	119	105	5	7	18.07	1.96	1.93	87.74	Diplômes professionnels divers [notaire, architecte, vétérin]	DIPLOMES PROFESSIONNELS DIVERS (NOTAIRE, ARCHITECTE, VETERINAIRE, JOURNALISTE…)
FR-R3-12	11.2	108	94	5	7	18.78	2.24	2.20	91.12	Diplôme universitaire du troisième cycle (DEA, DESS), Agrégation, Doctorat	DIPLOME UNIVERSITAIRE DU TROISIEME CYCLE (DEA, DESS), AGREGATION DOCTORAT
FR-R4-17	11.2	9	6	5	7	17.33	2.29	2.25	90.74	Diplôme universitaire de troisième cycle [DES, DESS, master]	DIPLOME UNIVERSITAIRE DU TROISIEME CYCLE (DES, DESS, MASTER DEUXIEME ANNEE PROFESSIONNEL), AGREGATION, DIPLOME DES GRANDES ECOLES
FR-R4-19	11.2	27	23	5	7	18.43	2.30	2.26	90.84	DEA, master deuxième année recherche	DEA, MASTER DEUXIEME ANNEE RECHERCHE
FR-R4-20	11.2	18	16	5	7	19.93	2.89	2.84	94.58	Autres doctorats [médecine, dentaire, pharmacie, vétérinaire]	AUTRES DOCTORATS (MEDECINE, DENTAIRE, PHARMACIE, VETERINAIRE)
FR-R4-21	11.2	15	12	5	7	18.58	2.46	2.42	92.02	Doctorat	DOCTORAT
UNITED KINGDOM											
GB-R1-00	0.0	629	441	1		10.09	-1.13	-1.22	30.89	No qualifications	No qualifications
GB-R2-01	0.0	648	478	1		10.21	-0.89	-1.22	30.89	No Qualifications	No qualifications
GB-R3-00	0.0	631	433	1		10.44	-1.14	-1.22	30.89	No qualifications	No qualifications
GB-R4-00	0.0	598	397	1		10.58	-1.29	-1.22	30.89	No qualifications	No qualifications
GB-R1-01	1.0	511	394	2		11.83	-0.38	-0.45	47.71	GCSE-O-level-CSE-NVQ1-NVQ2 or equiv	GCSE, CSE, O-level, NVQ/SVQ Level 1 or 2 or equivalent
GB-R3-01	1.0	528	389	2		12.07	-0.44	-0.45	47.71	GCSE/O-level/CSE/NVQ1/NVQ2 or equiv	GCSE, CSE, O-level, NVQ/SVQ Level 1 or 2 or equivalent
GB-R4-01	1.0	433	344	2		12.04	-0.41	-0.45	47.71	GCSE-O-level-CSE-NVQ1-NVQ2 or equiv	GCSE, CSE, O-level, NVQ/SVQ Level 1 or 2 or equivalent

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
GB-R2-02	1.1	178	146	2		11.30	-0.50	-0.55	44.63	CSE Grade 2-5 \ GCSE Grades D-G Or Equivalent	GCSE, CSE, O-level, NVQ/SVQ Level 1 or 2 or equivalent
GB-R2-03	1.2	338	264	2		11.77	-0.12	-0.13	53.75	CSE Grade 1 \ O-Level \ GCSE Grades A-C Or Equivalent	GCE A-level, Scottish Higher Grades, ONC or OND, NVQ/SVQ Level 3 or equivalent
GB-R1-02	2.0	243	180	3		13.25	0.27	0.05	59.46	A-level-NVQ3 or equiv	GCE A-level, Scottish Higher Grades, ONC or OND, NVQ/SVQ Level 3 or equivalent
GB-R3-02	2.0	275	195	3		13.59	-0.04	0.05	59.46	A-level/NVQ3 or equiv	RSA/OCR Higher Diploma, City & Guilds Full Technological/ Part IV, NVQ/SVQ Level 4 or 5, or equivalent
GB-R4-02	2.0	269	186	3		13.28	-0.07	0.05	59.46	A-level-NVQ3 or equiv	GCE A-level, Scottish Higher Grades, ONC or OND, NVQ/SVQ Level 3 or equivalent
GB-R2-04	2.1	259	180	3		12.92	0.35	0.38	64.63	A-Level, As-Level Or Equivalent	GCE A-level, Scottish Higher Grades, ONC or OND, NVQ/SVQ Level 3 or equivalent
GB-R1-03	3.0	182	165	5		12.87	0.19	0.03	57.26	NVQ4-NVQ5 or equiv	RSA/OCR Higher Diploma, City & Guilds Full Technological/ Part IV, NVQ/SVQ Level 4 or 5, or equivalent
GB-R3-03	3.0	220	183	5		13.72	-0.02	0.03	57.26	NVQ4/NVQ5 or equiv	RSA/OCR Higher Diploma, City & Guilds Full Technological/ Part IV, NVQ/SVQ Level 4 or 5, or equivalent
GB-R4-03	3.0	282	251	5		13.50	-0.04	0.03	57.26	NVQ4-NVQ5 or equiv	RSA/OCR Higher Diploma, City & Guilds Full Technological/ Part IV, NVQ/SVQ Level 4 or 5, or equivalent
GB-R2-05	4.0	354	298	5		16.19	1.57	1.72	80.94	Degree \ Postgraduate Qualification Or Equivalent	University/CNAA Bachelor Degree, Masters Degree, Diploma or M.Phil., HNC or HND, teacher training qualification, nursing qualification, or equivalent
GB-R1-04	4.1	459	401	5		16.54	1.31	1.21	79.21	Degree-HNC-teacher training-nursing or equiv	University/CNAA Bachelor Degree, Masters Degree, Diploma or M.Phil., HNC or HND, teacher training qualification, nursing qualification, or equivalent
GB-R3-04	4.1	694	592	5		16.87	1.07	1.21	79.21	Degree/HNC/teacher training/nursing or equiv	University/CNAA Bachelor Degree, Masters Degree, Diploma or M.Phil., HNC or HND, teacher training qualification, nursing qualification, or equivalent
GB-R4-04	4.1	727	611	5		16.89	1.02	1.21	79.21	Degree-HNC-teacher training-nursing or equiv	University/CNAA Bachelor Degree, Masters Degree, Diploma or M.Phil., HNC or HND, teacher training qualification, nursing qualification, or equivalent
GB-R1-05	4.2	21	20	5		19.74	2.53	2.41	91.62	PhD-DPhil or equiv	Ph.D., D.Phil or equivalent
GB-R3-05	4.2	32	30	5		18.64	1.94	2.41	91.62	PhD/DPhil or equiv	Ph.D., D.Phil or equivalent
GB-R4-05	4.2	29	27	5		20.07	2.22	2.41	91.62	PhD-DPhil or equiv	Ph.D., D.Phil or equivalent

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
GREECE											
GR-R1-01	1.0	339	223	1		3.01	-1.28	-1.21	15.00	Illiterate-not completed primary	Αναλφάβητος /η, μερικές τάξεις του Δημοτικού
GR-R2-01	1.0	290	179	1		3.09	-1.10	-1.21	15.00	Illiterate|not completed primary	Αναλφάβητος/η μερικές τάξεις του Δημοτικού Δημοτικό
GR-R4-00	1.0	59	31	1		3.03	-1.56	-1.21	15.00	Analphabetic (not knowing reading and writing),not completed primary education/only few classes of primary education	Αναλφάβητος /η , δεν συμπλήρωσε τη δημοτική εκπαίδευση /μερικές τάξεις του Δημοτικού
GR-R1-02	2.0	696	547	1		6.10	-0.91	-0.94	19.12	Primary	Δημοτικό
GR-R2-02	2.0	665	549	1		6.12	-0.88	-0.94	19.12	Primary	Δημοτικό
GR-R4-01	2.0	391	330	1		6.00	-1.15	-0.94	19.12	Primary education	Πρωτοβάθμια εκπαίδευση / Δημοτικό
GR-R1-03	3.0	444	338	2		9.90	-0.31	-0.47	28.43	Partial secondary	Μερική μέση εκπαίδευση (δηλ. μερικές τάξεις εξαταξίου γυμνασίου, νυχτερινό γυμνάσιο, κατώτερη σχολή)
GR-R2-03	3.0	359	279	2		9.75	-0.46	-0.47	28.43	Partial secondary	Μερική μέση εκπαίδευση (δηλ. μερικές τάξεις εξαταξίου γυμνασίου νυχτερινό γυμνάσιο, κατώτερη σχολή)
GR-R4-02	3.0	351	279	2		9.74	-0.69	-0.47	28.43	Lower secondary education (i.e. only few classes of secondary education,night school,technical vocational schools)	Μερική μέση εκπαίδευση (δηλ. μερικές τάξεις εξαταξίου γυμνασίου, νυχτερινό γυμνάσιο, κατώτερη σχολή)
GR-R1-04	4.0	723	549	3		12.64	0.47	0.27	47.15	Full secondary	Πλήρης μέση εκπαίδευση(εξατάξιο γυμνάσιο, λύκειο, μέσες σχολές)
GR-R2-04	4.0	641	494	3		12.42	0.29	0.27	47.15	Full secondary	Πλήρης μέση εκπαίδευση (εξατάξιο γυμνάσιο, λύκειο, μέσες σχολές)
GR-R4-03	4.0	735	604	3		12.21	0.05	0.27	47.15	Upper secondary education	Πλήρης μέση εκπαίδευση (εξατάξιο γυμνάσιο, λύκειο (Ενιαίο ή ΤΕΕ), μέσες σχολές)
GR-R1-05	5.0	101	80	5		16.28	1.05	0.92	64.59	Post secondary-polytechnic	Ανώτερη Σχολή (πτυχιούχος)
GR-R2-05	5.0	154	134	5		15.55	0.99	0.92	64.59	Post secondary|polytechnic	Ανώτερη Σχολή (πτυχιούχος)
GR-R4-04	5.0	184	161	5		14.96	0.79	0.92	64.59	Post-compulsory Secondary Education/non-tertiary education (i.e.Public and Private Vocational Training Institutes etc.)	Μεταλυκειακή μη Πανεπιστημιακή εκπαίδευση (πτυχιούχος μεταδευτεροβάθμιας εκπαίδευσης, δηλ. Δημόσια και Ιδιωτικά Ινστιτούτα Επαγγελματικής Κατάρτισης (ΙΕΚ), Ιδιωτικές Σχολές και Κολλέγια, ΚΑΤΕ, ΚΑΤΕΕ και εκκλησιαστική εκπαίδευση)

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
GR-R1-06	6.0	209	183	5		16.78	2.08	1.76	82.02	University degree	Ανώτατη Σχολή (πτυχιούχος ΑΕΙ και ΤΕΙ)
GR-R2-06	6.0	257	218	5		16.51	1.97	1.76	82.02	University degree	Ανώτατη Σχολή (πτυχιούχος)
GR-R4-05	6.0	320	272	5		16.56	1.36	1.76	82.02	Higher Education:University Diplomas holders and Technical Educational Institutions Diplomas holders	Ανώτατη Σχολή (πτυχιούχος)
GR-R1-07	7.0	49	47	5		19.89	2.87	2.91	94.17	Post graduate degree	Μεταπτυχιακό δίπλωμα
GR-R2-07	7.0	34	32	5		18.74	3.15	2.91	94.17	Post graduate degree	Μεταπτυχιακό δίπλωμα
GR-R4-06	7.0	30	30	5		18.67	2.60	2.91	94.17	MA Degree	Μεταπτυχιακό δίπλωμα
GR-R4-07	8.0	2	2	5		19.50	4.65	2.91	94.17	PhD Degree	Διδακτορικός τίτλος
CROATIA											
HR-R4-00	0.0	108	56	1	1	4.06	-1.65	-1.55	18.74	Nezavrsena osnovna skola	Nezavršena osnovna škola
HR-R4-01	1.0	230	178	2	2	7.67	-1.31	-1.22	23.75	Zavrsena osnovna skola	Završena osnovna škola
HR-R4-02	2.0	290	239	3	3	11.00	-0.72	-0.66	34.17	Srednjoskolsko strucno obrazovanje (do 3 godien)	Srednjoškolsko stručno obrazovanje (do 3 godine)
HR-R4-03	3.0	538	385	3	4	12.13	0.22	0.24	53.90	Srednjoskosko obrazovanje (4 godine)	Srednjoškolsko obrazovanje (4 godine)
HR-R4-04	4.0	127	110	5	5	14.39	0.81	0.81	66.13	Visa skola	Viša škola
HR-R4-05	5.0	170	136	5	6	17.05	1.89	1.84	83.28	Fakultet	Fakultet
HR-R4-06	6.0	18	15	5	7	19.40	2.05	2.00	85.15	Magisterij ili doktorat	Magisterij ili doktorat
HUNGARY											
HU-R1-01	1.0	6	6	1	1	0.00	-1.95	-1.71	18.00	Never attented school	nem járt iskolába
HU-R2-01	1.0	4	4	1	1	0.00	-1.99	-1.71	18.00	No formal schooling	nem járt iskolába

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
HU-R3-01	1.0	4	3	1	1	0.00	-1.64	-1.71	18.00	No formal schooling	Nem járt iskolába
HU-R4-01	1.0	4	2	1	1	0.00	-1.67	-1.71	18.00	not attend any school at all	nem járt iskolába
HU-R1-02	2.0	32	20	1	1	5.00	-1.59	-1.42	22.02	1-4 form in primary school	1–4 osztály elemi/általános iskola vagy azzal egyenértékű
HU-R2-02	2.0	15	7	1	1	3.86	-1.83	-1.42	22.02	1-4 years of elementary	1 – 4 osztály elemi/általános iskola vagy azzal egyenértékű
HU-R3-02	2.0	19	9	1	1	4.67	-1.36	-1.42	22.02	1-4 years of elementary	1 – 4 osztály elemi/általános iskola vagy azzal egyenértékű
HU-R4-11	2.0	20	8	1	1	3.88	-1.61	-1.42	22.02	Primary school (1-4 classes) or equivalent	1–4 osztály elemi/általános iskola vagy azzal egyenértékű
HU-R1-03	3.0	102	57	1	1	6.39	-1.69	-1.52	20.59	5-7 form in primary school	5-7 osztály általános iskola vagy azzal egyenértékű
HU-R2-03	3.0	80	35	1	1	6.17	-1.83	-1.52	20.59	5-7 years of elementary	5 – 7 osztály általános iskola vagy azzal egyenértékű
HU-R3-03	3.0	95	38	1	1	6.50	-1.46	-1.52	20.59	5-7 years of elementary	5-7 osztály általános iskola vagy azzal egyenértékû
HU-R4-12	3.0	73	33	1	1	6.39	-1.77	-1.52	20.59	Primary school (5-7 classes) or equivalent	5-7 osztály általános iskola vagy azzal egyenértékű
HU-R1-04	4.0	416	294	2	2	8.51	-1.00	-1.04	28.34	Completed primary school	befejezett általános iskola vagy azzal egyenértékű
HU-R2-04	4.0	333	238	2	2	8.18	-1.16	-1.04	28.34	8 years of elementary	befejezett általános iskola vagy azzal egyenértékű
HU-R3-04	4.0	383	281	2	2	8.36	-1.21	-1.04	28.34	8 years of elementary	Befejezett általános iskola vagy azzal egyenértékû
HU-R4-13	4.0	343	219	2	2	8.49	-1.26	-1.04	28.34	Completed Primary School or equivalent	befejezett általános iskola vagy azzal egyenértékű
HU-R1-05	5.0	413	370	2	2	11.16	-0.38	-0.41	40.74	Trade school	szakmunkásképző
HU-R2-05	5.0	347	314	3	3	10.85	-0.51	-0.41	40.74	Vocational	szakmunkásképző, szakiskola
HU-R3-05	5.0	375	327	3	3	11.45	-0.34	-0.41	40.74	Vocational	Szakmunkásképző, szakiskola
HU-R4-21	5.0	418	366	2	2	11.66	-0.59	-0.41	40.74	Certificate of Trade school	szakmunkásképző, szakiskola
HU-R1-06	6.0	59	34	2	3	12.56	0.10	0.03	50.31	Not completed secondary school	befejezetlen középiskola

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
HU-R2-06	6.0	49	33	2	3	12.03	-0.24	0.03	50.31	Uncomplete secondary qualification	befejezetlen középiskola
HU-R3-06	6.0	46	35	2	3	12.54	0.00	0.03	50.31	Uncomplete secondary qualification	Befejezetlen középiskola
HU-R4-22	6.0	50	21	2	3	13.70	0.42	0.03	50.31	Incompleted Secondary School	befejezetlen középiskola
HU-R1-07	7.0	382	300	3	4	13.53	0.53	0.38	58.05	Completed secondary school	érettségi, befejezett középiskola vagy azzal egyenértékű
HU-R2-07	7.0	295	219	3	4	12.05	0.34	0.38	58.05	Gymnasium, matura	érettségi, befejezett középiskola vagy azzal egyenértékű
HU-R3-07	7.0	253	201	3	4	13.11	0.40	0.38	58.05	Gymnasium, matura	Érettségi, befejezett középiskola vagy azzal egyenértékû
HU-R4-31	7.0	260	194	3	4	13.53	0.37	0.38	58.05	Completed secondary school or equivalent	érettségi, befejezett középiskola vagy azzal egyenértékű
HU-R2-08	8.0	92	80	4	4	12.23	0.42	0.47	59.93	Sec technical+matura	érettségire épülő felsőfokra nem akkreditált szakképzés, középfokú technikum
HU-R3-08	8.0	88	75	4	4	14.04	0.59	0.47	59.93	Sec. technical+matura	Érettségire épülõ felsõfokra nem akkreditált szakképzés, középfokú technikum
HU-R4-32	8.0	93	80	4	4	14.38	0.56	0.47	59.93	Higher technical+matura	felsőfokra akkreditált szakképzés, felsőfokú technikum
HU-R2-09	9.0	34	26	5	5	12.77	0.69	0.75	65.73	Higher technical+matura	Felsõfokra akkreditált szakképzés, felsõfokú technikum
HU-R3-09	9.0	33	28	5	5	14.29	0.99	0.75	65.73	Higher technical+matura	érettségire épülő felsőfokra nem akkreditált szakképzés középfokú technikum
HU-R4-41	9.0	39	28	5	5	15.00	0.82	0.75	65.73	Higher form of vocational education	felsőfokra akkreditált szakképzés, felsőfokú technikum
HU-R2-10	10.0	27	19	3	5	13.79	0.95	1.21	74.10	Uncomplete higher qualification	befejezetlen felsőfokú tanintézet (főiskola vagy egyetem)
HU-R3-10	10.0	17	16	3	5	15.56	1.48	1.21	74.10	Uncomplete higher qualification	Befejezetlen felsõfokú tanintézet (fõiskola vagy egyetem)
HU-R4-42	10.0	24	17	3	5	16.29	1.64	1.21	74.10	Attended some years of Higher Education (at least 1 year) but not holding a Diploma	befejezetlen felsőfokú tanintézet (főiskola vagy egyetem)
HU-R1-09	11.0	126	116	5	6	16.08	1.57	1.42	77.49	College	főiskolai diploma
HU-R2-11	11.0	131	118	5	6	14.94	1.44	1.42	77.49	College degree completed	főiskolai diploma

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
HU-R3-11	11.0	111	97	5	6	17.34	1.56	1.42	77.49	College degree completed	Főiskolai diploma
HU-R4-51	11.0	142	126	5	6	17.48	1.70	1.42	77.49	Diploma in College	főiskolai diploma
HU-R1-10	12.0	81	68	5	7	18.33	2.67	2.31	88.34	University	egyetemi diploma
HU-R2-12	12.0	84	80	5	7	16.91	2.46	2.31	88.34	University degree completed	egyetemi diploma
HU-R3-12	12.0	70	61	5	7	18.95	2.67	2.31	88.34	University degree completed	egyetemi diploma
HU-R4-52	12.0	66	59	5	7	19.50	2.48	2.31	88.34	Diploma in University	egyetemi diploma
HU-R1-11	13.0	9	9	5	7	19.00	3.22	2.58	90.61	Postgraduate studies	posztgraduális végzettség
HU-R2-13	13.0	2	2	5	7	17.00	2.98	2.58	90.61	Postgraduate qualification	posztgraduális végzettség
HU-R3-13	13.0	7	5	5	7	20.25	2.32	2.58	90.61	Postgraduate qualification	posztgraduális végzettség
HU-R4-53	13.0	3	3	5	7	19.33	2.68	2.58	90.61	Post-Graduate Diploma holder	posztgraduális végzettség
HU-R1-12	14.0	5	5	5	7	18.80	3.74	2.44	89.43	Degree-PhD	felsőfokú végzettség, tudományos fokozattal
HU-R2-14	14.0	5	5	5	7	16.80	3.05	2.44	89.43	Scientific degree	felsőfokú végzettség, tudományos fokozattal
HU-R3-14	14.0	11	11	5	7	17.56	2.29	2.44	89.43	Scientific degree	felsőfokú végzettség, tudományos fokozattal
HU-R4-61	14.0	8	8	5	7	18.00	2.42	2.44	89.43	PhD holder	felsőfokú végzettség, tudományos fokozattal
IRELAND											
IE-R1-01	1.0	87	63	1		9.12	-1.46	-1.52	25.31	None-primary not completed	None/Primary not completed
IE-R2-01	1.0	72	58	1		8.25	-1.35	-1.52	25.31	None|primary not completed	None/Primary not completed
IE-R3-01	1.0	98	63	1		8.62	-1.52	-1.52	25.31	None/primary not completed	None/Primary not completed
IE-R4-01	1.0	39	27	1		7.33	-1.61	-1.52	25.31	None/Primary not completed	None / Primary not completed

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
IE-R1-02	2.0	370	285	1		9.61	-1.16	-1.23	30.40	Primary or equivalent	Primary or equivalent
IE-R2-02	2.0	453	342	1		8.83	-1.07	-1.23	30.40	Primary or equivalent	Primary or equivalent
IE-R3-02	2.0	227	153	1		8.93	-1.27	-1.23	30.40	Primary or equivalent	Primary or equivalent
IE-R4-02	2.0	249	175	1		9.11	-1.39	-1.23	30.40	Primary or equivalent	Primary or equivalent
IE-R1-03	3.0	505	372	2		11.58	-0.64	-0.77	39.37	Intermediate-junior-group cert or equiv	Junior/Inter Cert/Group Cert or equivalent
IE-R2-03	3.0	481	373	2		10.93	-0.73	-0.77	39.37	Intermediate|junior|group cert or equiv	Intermediate/Junior/Group Certificate or equivalent
IE-R3-03	3.0	366	260	2		11.00	-0.86	-0.77	39.37	Intermediate/junior/group cert or equiv	Intermediate/Group/Junior Cert or equivalent
IE-R4-03	3.0	345	260	2		11.67	-0.86	-0.77	39.37	Intermediate/Group/Junior Cert or equivalent	Intermediate/Group/Junior Cert or equivalent
IE-R1-04	4.0	475	369	3		13.47	0.01	0.01	56.28	Leaving cert or equivalent	Leaving Cert or equivalent
IE-R2-04	4.0	602	491	3		13.09	0.07	0.01	56.28	Leaving cert or equivalent	Leaving Certificate or equivalent
IE-R3-04	4.0	388	277	3		12.65	-0.02	0.01	56.28	Leaving cert or equivalent	Leaving Certificate or equivalent
IE-R4-04	4.0	376	270	3		13.72	-0.14	0.01	56.28	Leaving Cert or equivalent	Leaving Cert or equivalent
IE-R1-05	5.0	347	285	5		15.04	0.85	0.51	66.57	Diploma-certificate	Diploma/Certificate
IE-R2-05	5.0	348	286	5		14.76	0.60	0.51	66.57	Diploma|certificate	Diploma/Certificate
IE-R3-05	5.0	338	285	5		13.68	0.32	0.51	66.57	Diploma/certificate	Diploma or Certificate
IE-R4-05	5.0	380	327	5		15.57	0.19	0.51	66.57	Diploma or Certificate	Diploma or Certificate
IE-R1-06	6.0	122	106	5		16.11	1.46	1.41	81.31	Primary degree	Primary degree
IE-R2-06	6.0	224	176	5		16.25	1.53	1.41	81.31	Primary degree	Primary degree
IE-R3-06	6.0	179	135	5		14.98	1.18	1.41	81.31	Primary degree	Primary degree

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
IE-R4-06	6.0	208	180	5		17.66	1.20	1.41	81.31	Primary Degree	Primary Degree
IE-R1-07	7.0	140	128	5		17.84	1.87	1.96	87.22	Postgraduate-higher degree	Post graduate/higher degree
IE-R2-07	7.0	106	97	5		17.40	2.20	1.96	87.22	Postgraduate|higher degree	Post graduate/higher degree
IE-R3-07	7.0	178	154	5		19.09	1.65	1.96	87.22	Postgraduate/higher degree	Post graduate/higher degree
IE-R4-07	7.1	145	134	5		19.45	1.68	1.76	85.54	Postgraduate Higher Diploma/Masters	Postgraduate Higher Diploma / Masters
IE-R4-08	7.2	18	15	5		20.64	2.36	2.47	91.67	PhD	PhD
ISRAEL											
IL-R1-00	0.0	46	35	1	1	1.32	-1.94	-1.96	18.73	No formal qualification	אין השכלה פורמלית
IL-R4-00	0.0	80	51	1		4.72	-2.10	-1.96	18.73	Not completed primary education	לא סיים השכלה יסודית
IL-R1-01	1.0	208	154	2	2	6.98	-1.60	-1.44	26.76	Lowest formal qualification	יסודית
IL-R4-01	1.0	279	190	2		8.48	-1.42	-1.44	26.76	Primary or junior high school	יסודית או חטיבת ביניים
IL-R4-02	2.0	492	351	3		11.57	-0.96	-0.91	37.77	Secondary school WITHOUT a matriculation certificate	תיכונית ללא תעודת בגרות
IL-R1-02	2.1	150	103	2	2	9.86	-1.40	-1.34	28.52	Not finish vocational high school	תיכונית מקצועית חלקית (לא סיים תיכון מקצועי)
IL-R1-03	2.2	178	141	2	3	11.88	-0.60	-0.57	43.93	Full voc hs without matriculation certificate	תיכונית מקצועית מלאה, אך ללא תעודת בגרות
IL-R1-05	2.3	185	87	2	2	10.24	-0.90	-0.86	37.80	Not finish general high school	תיכונית עיונית חלקית (לא סיים תיכון עיוני)
IL-R1-06	2.4	156	107	2	3	12.04	-0.64	-0.61	43.06	Full general hs without matriculation certificate	תיכונית עיונית מלאה אך ללא תעודת בגרות
IL-R4-03	3.0	449	273	3		12.15	-0.27	-0.25	50.23	Secondary school WITH a matriculation certificate	תיכונית מקצועית מלאה עם תעודת בגרות
IL-R1-04	3.1	147	93	3	4	12.15	-0.38	-0.36	48.54	Full voc hs with matriculation certificate	תיכונית עיונית מלאה עם תעודת בגרות
IL-R1-07	3.2	291	150	3	4	12.03	-0.32	-0.29	49.95	Full general hs with matriculation certificate	תיכונית עם תעודת בגרות

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
IL-R1-09	4.0	23	13	3	4	12.00	-0.13	-0.16	52.90	Yeshiva hs with full matriculation certificate	ישיבה תיכונית עם תעודת בגרות
IL-R4-05	4.0	47	17	3		12.47	-0.21	-0.16	52.90	Yeshiva high school WITH a matriculation certificate	ישיבה תיכונית עם תעודת בגרות
IL-R1-08	5.0	11	7	2	3	11.67	-0.23	0.03	57.14	Yeshiva hs without full matriculation certificate	ישיבה תיכונית ללא תעודת בגרות
IL-R4-04	5.0	90	49	3		12.23	0.06	0.03	57.14	Yeshiva high school WITHOUT a matriculation certificate	ישיבה תיכונית ללא תעודת בגרות
IL-R1-10	6.0	283	220	5	5	14.00	0.28	0.29	62.53	Post secondary	על תיכונית (סמינר, ישיבה, בי"ס לאחיות, בי"ס להנדסאים וכו')
IL-R4-06	6.0	379	289	5		14.29	0.29	0.29	62.53	Post secondary, non tertiary	על תיכונית לא אקדמית (סמינר, ישיבה, בי"ס לאחיות, בי"ס להנדסאים וכו')
IL-R1-11	7.0	201	91	3	5	14.90	0.70	0.96	75.09	Not finish University degree	אוניברסיטאית חלקית (לא סיים אוניברסיטה, אין תואר)
IL-R1-12	7.0	360	292	5	6	16.26	1.10	0.96	75.09	University Ba degree completed	ראשון תואר עם מלאה אוניברסיטאית (BA)
IL-R4-07	7.0	418	336	5		15.99	0.96	0.96	75.09	A bachelor academic degree, B.A., or a similar degree that includes an academic diploma	או תואר אקדמי מקביל, [7 .BA] תואר אקדמי ראשון
IL-R1-13	8.0	228	205	5	7	18.23	1.50	1.46	83.71	University Ma -Phd degree completed	אוניברסיטאית מלאה עם תואר שני או יותר (MA או יותר)
IL-R4-08	8.1	130	117	5		17.41	1.53	1.49	82.77	A master's degree, M.A., WITHOUT a thesis	ללא תיזה [8 .MA] תואר אקדמי שני
IL-R4-09	8.2	78	65	5		18.38	1.78	1.73	85.54	A master's degree, M.A., WITH a thesis	עם תיזה [כולל תואר דר' [9 .MA] תואר אקדמי שני(MD , ברפואה
IL-R4-10	8.3	32	27	5		19.73	2.44	2.37	91.19	A doctoral degree, Ph.D., or a similar degree	או תואר מקביל, Ph.D 10 . תואר אקדמי שלישי
ICELAND											
IS-R2-01	1.0	33	14	1	2	7.86	-1.50	-1.66	22.10	Primary	Engu, barnaskólanámi eða minna
IS-R2-02	2.0	142	83	1	2	9.61	-0.99	-1.10	33.68	Lower secondary	Grunnskólaprófi/gagnfræðaprófi
IS-R2-03	3.0	43	34	2	3	11.06	-0.67	-0.75	42.29	Upper secondary	Stuttu starfsnámi, ár eða minna
IS-R2-04	4.0	118	104	4	4	13.11	-0.39	-0.45	50.03	Post secondary, non-tert	Lengra starfsnámi, iðnnámi

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
IS-R2-05	5.0	81	50	3	6	14.88	0.19	0.19	66.10	Tertiary	Stúdentsprófi
IS-R2-06	6.0	89	83	5	7	17.12	1.04	1.13	83.78	Tertiary second stage	Háskólastig, fyrstu gráðu, t.d. BA/BS/BEd
IS-R2-07	7.0	54	52	5		18.92	1.47	1.60	89.40	undocumented: uni grad	Háskólastig, framhaldsnámi
ITALY											
IT-R1-01	1.0	62	29	1		2.62	-1.77	-1.55	11.97	Senza titolo	Senza titolo
IT-R2-01	1.0	45	25	1		6.15	-1.56	-1.55	11.97	Senza titolo	Senza titolo
IT-R1-02	2.0	221	187	1		5.29	-1.22	-1.17	17.10	Licenza elementare	Licenza elementare
IT-R2-02	2.0	289	220	1		5.36	-1.32	-1.17	17.10	Licenza elementare	Licenza elementare
IT-R1-03	3.0	394	315	2		8.97	-0.54	-0.56	28.61	Licenza media - avviamento professionale	Licenza media/avviamento professionale
IT-R2-03	3.0	473	359	2		8.94	-0.69	-0.56	28.61	Licenza media\avviamento professionale	Licenza media/avviamento professionale
IT-R1-04	4.0	415	328	3		13.38	0.62	0.56	57.93	Diploma scuola media superiore	Diploma di scuola media superiore
IT-R2-04	4.0	528	425	3		13.42	0.59	0.56	57.93	Diploma di scuola media superiore	Diploma di scuola media superiore
IT-R2-05	5.0	13	10	4		15.70	0.76	0.70	61.67	Specializzazione post-diploma	Specializzazione post-diploma
IT-R2-06	6.1	35	27	5		17.37	1.46	1.35	84.24	Diploma universitario o Laurea triennale	Diploma universitario
IT-R1-05	6.1	18	16	5		16.31	1.68	1.55	80.44	Diploma universitario	Diploma universitario o Laurea triennale
IT-R1-06	6.1	82	73	5		18.45	2.18	2.01	87.14	Laurea	Laurea
IT-R2-07	6.2	120	115	5		18.80	1.97	1.82	84.63	Laurea specialistica	Laurea specialistica
IT-R1-07	7.0	14	14	5		20.85	3.71	2.77	94.02	Specializzazione post-laurea	Specializzazione post-laurea
IT-R2-08	7.0	22	20	5		20.63	2.52	2.77	94.02	Specializzazione post-laurea	Specializzazione post-laurea

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
LITHUANIA											
LT-R4-00	0.0	24	15	1		2.73	-1.87	-1.91	20.35	Not completed primary	*not documented*
LT-R4-01	1.0	171	64	1		4.94	-1.54	-1.57	25.09	Primary	Nav mācījies skolā
LT-R4-02	2.0	34	22	1		9.09	-1.36	-1.39	27.90	Vocational (without completing basic)	Sākumskolas/ nepabeigta pamatizglītība
LT-R4-03	3.0	223	78	2		8.83	-1.21	-1.23	30.45	Basic (including youth schools)	Pamatizglītība
LT-R4-04	4.0	105	95	2		11.12	-0.79	-0.80	38.18	Vocational (completing basic)	Vispārējā vidējā
LT-R4-05	5.0	157	137	3		11.28	-0.67	-0.67	40.67	Vocational (after completing basic)	Profesionālā pamatizglītība (bez vidējās)
LT-R4-06	6.0	341	226	3		11.16	-0.51	-0.51	43.83	Secondary (including gymnasium schools)	Vidējā profesionālā (arodizglītība, vidējā speciālā)
LT-R4-07	7.0	337	325	5		13.39	-0.25	-0.25	49.13	Special secondary (including high technical schools)	1. līmeņa profesionālā augstākā (koledžas)
LT-R4-08	8.0	112	100	4		13.08	-0.17	-0.16	50.80	Vocational (after completing secondary)	Bakalaura grāds (profesionālais vai akadēmiskais)
LT-R4-09	9.0	190	172	5		15.25	0.99	1.03	72.86	Higher vocational (non-university degree)	Maģistra grāds (profesionālais vai akadēmiskais)
LT-R4-10	10.0	306	281	5		16.67	1.57	1.62	81.24	Higher (university degree)	Augstākā izglītība iegūta padomju laikā
LT-R4-11	11.0	2	1	5		21.00	3.51	3.63	95.57	Doctoral or candidate of sciences degree	Doktora grāds
LUXEMBOURG											
LU-R1-00	0.0	20	14	1	1	5.30	-1.28	-1.34	19.58	Pas de diplôme-qualifications	Keen Diplom
LU-R2-00	0.0	40	29	1	1	6.71	-1.51	-1.34	19.58	No qualification	Keen Diplom
LU-R1-01	1.0	254	160	1	1	7.66	-1.22	-1.19	22.25	Ecole primaire	Ecole primaire
LU-R2-01	1.0	224	167	1	1	6.52	-1.30	-1.19	22.25	Primary school	Ecole primaire
LU-R1-02	2.0	120	82	1	1	9.22	-0.74	-0.75	30.88	Primaire supérieur	Primaire supérieur

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
LU-R2-02	2.0	106	77	1	1	9.08	-0.86	-0.75	30.88	Upper primary school	Primaire supérieur
LU-R1-03	3.0	98	78	1	1	9.92	-0.88	-0.82	29.33	Enseignement compl,mentaire	Enseignement complémentaire
LU-R2-03	3.0	99	87	1	1	9.30	-0.87	-0.82	29.33	Complementary school	Enseignement complémentaire
LU-R1-04	4.0	52	28	2	2	10.85	-0.21	-0.31	41.11	Certificat d enseignement secondaire technique inférieur	Certificat d'enseignement secondaire technique inférieur
LU-R2-04	4.0	126	65	2	2	10.36	-0.39	-0.31	41.11	Lower technical secundary school	Certificat d'enseignement secondaire technique inférieur
LU-R1-05	5.0	22	16	2	2	11.50	-0.62	-0.57	35.02	Certificat d apprentissage	Certificat d'apprentissage
LU-R2-05	5.0	28	23	2	2	10.35	-0.59	-0.57	35.02	Craftsman diploma	Certificat d'apprentissage
LU-R1-06	6.0	22	19	3	3	9.78	-0.74	-0.63	33.60	Certificat de Capacit, Manuelle : CCM	Certificat de Capacité Manuelle : CCM
LU-R2-06	6.0	19	15	3	3	11.50	-0.58	-0.63	33.60	Skilled craftsman	Certificat de Capacité Manuelle : CCM
LU-R1-07	7.0	36	26	3	3	10.88	-0.32	-0.19	44.06	Certificat d Initiation Technique et Professionnelle?: CITP	Certificat d'Initiation Technique et Professionnelle : CITP
LU-R2-07	7.0	21	15	3	3	10.87	-0.01	-0.19	44.06	First professional diploma	Certificat d'Initiation Technique et Professionnelle : CITP
LU-R1-08	8.0	237	195	3	3	11.75	-0.40	-0.35	40.21	Certificat d Aptitude Technique et Professionnelle : CATP	Certificat d'Aptitude Technique et Professionnelle : CATP
LU-R2-08	8.0	274	231	3	3	11.43	-0.35	-0.35	40.21	First professional diploma	Certificat d'Aptitude Technique et Professionnelle : CATP
LU-R1-09	9.0	36	23	3	3	14.26	0.47	0.45	60.42	Diplôme de technicien [jusque 13e dans le régime technicien]	Diplôme de technicien (jusque 13e dans le régime technicien)
LU-R2-09	9.0	28	22	3	3	12.25	0.49	0.45	60.42	First technical high school diploma	Diplôme de technicien (jusque 13e dans le régime technicien)
LU-R1-10	10.0	50	28	3	4	14.04	0.47	0.35	57.85	Bac technique [jusque 13e ou 14e du régime technique]	Bac technique (jusque 13e ou 14e du régime technique)
LU-R2-10	10.0	55	34	3	4	13.47	0.29	0.35	57.85	Second technical high school	Bac technique (jusque 13e ou 14e du régime technique)
LU-R1-11	11.0	115	56	2	2	11.26	0.04	-0.02	48.53	Enseignement secondaire général inférieur	Enseignement secondaire général inférieur
LU-R2-11	11.0	96	60	2	2	11.31	-0.08	-0.02	48.53	General lower secondary school	Enseignement secondaire général inférieur

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
LU-R1-12	12.0	139	93	3	4	13.41	0.82	0.71	66.47	Diplôme de fin d'études secondaires	Diplôme de fin d'études secondaires
LU-R2-12	12.0	149	103	3	4	13.48	0.69	0.71	66.47	Secondary diploma	Diplôme de fin d'études secondaires
LU-R1-13	13.0	32	29	4	5	12.11	0.04	0.05	50.16	Brevet de maîtrise artisanale	Brevet de maîtrise artisanale
LU-R2-13	13.0	63	60	4	5	12.49	0.05	0.05	50.16	Master craftsman diploma	Brevet de maîtrise artisanale
LU-R1-14	14.0	53	39	5	5	15.66	1.04	1.07	74.18	Enseignement supérieur - BAC +2	Enseignement supérieur - BAC +2
LU-R2-14	14.0	61	46	5	5	15.22	1.22	1.07	74.18	High school + 2 years university	Enseignement supérieur - BAC +2
LU-R1-15	15.0	57	48	5	6	17.26	1.33	1.22	77.02	Enseignement supérieur - BAC +3	Enseignement supérieur - BAC +3
LU-R2-15	15.0	79	68	5	6	16.15	1.27	1.22	77.02	High school + 3 years university	Enseignement supérieur - BAC +3
LU-R1-16	16.0	69	57	5	6	17.44	2.16	1.91	87.14	Enseignement supérieur - BAC +4	Enseignement supérieur - BAC +4
LU-R2-16	16.0	61	55	5	6	17.58	1.90	1.91	87.14	High school + 4 years university	Enseignement supérieur - BAC +4
LU-R1-17	17.0	57	51	5	7	18.55	2.13	2.18	89.93	Enseignement supérieur - BAC +5 ou plus [sans obt. doct.]	Enseignement supérieur - BAC +5 ou plus (mais sans l'obtention d'un doctorat)
LU-R2-17	17.0	66	63	5	7	18.74	2.47	2.18	89.93	High school + 5 years university without obt dipl	Enseignement supérieur - BAC +5 ou plus (mais sans l'obtention d'un doctorat)
LU-R1-18	18.0	11	8	5	7	21.14	1.73	2.33	91.20	Enseignement supérieur - Doctorat	Enseignement supérieur - Doctorat
LU-R2-18	18.0	14	13	5	7	18.55	2.93	2.33	91.20	High school + 5 years university without obt. dipl.	Enseignement supérieur - Doctorat
LATVIA											
LV-R3-01	1.0	5	2	1	1	0.00	-2.48	-2.66	10.52	Haven't attended any education institution	Nav mācījies skolā
LV-R3-02	2.0	77	36	1	1	6.73	-1.66	-1.86	18.58	Primary or not completed basic education	Sākumskolas/ nepabeigta pamatizglītība
LV-R4-02	2.0	75	31	1	1	5.84	-1.84	-1.86	18.58	Primary or not completed basic education	Sākumskolas/ nepabeigta pamatizglītība
LV-R3-03	3.0	443	218	2	2	7.60	-1.22	-1.33	26.34	Basic education	Pamatizglītība

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
LV-R4-03	3.0	335	186	2	2	8.13	-1.27	-1.33	26.34	Basic education	Pamatizglītība
LV-R3-05	4.0	84	73	2	2	11.63	-0.54	-0.64	38.83	Vocational basic education	Profesionālā pamatizglītība (bez vidējās)
LV-R4-05	4.0	63	56	2	2	10.96	-0.70	-0.64	38.83	Vocational basic education	Profesionālā pamatizglītība (bez vidējās)
LV-R3-04	5.0	504	298	3	4	11.00	-0.29	-0.40	43.71	General secondary (upper secondary)	Vispārējā vidējā
LV-R4-04	5.0	442	321	3	4	11.14	-0.47	-0.40	43.71	General secondary (upper secondary)	Vispārējā vidējā
LV-R3-06	6.0	455	384	3	3	12.47	-0.06	-0.13	49.44	Secondary vocational (upper)	Vidējā profesionālā (arodizglītība, vidējā speciālā)
LV-R4-06	6.0	577	514	3	3	12.66	-0.18	-0.13	49.44	Secondary vocational (upper)	Vidējā profesionālā (arodizglītība, vidējā speciālā)
LV-R3-07	7.0	72	47	5	5	14.33	0.99	0.99	71.25	First stage professional higher (college)	1. līmeĦa profesionālā augstākā (koledžas)
LV-R4-07	7.0	75	59	5	5	15.04	0.84	0.99	71.25	First stage professional higher (college)	1. līmeņa profesionālā augstākā (koledžas)
LV-R3-10	8.0	154	143	5	7	15.96	1.22	1.32	76.62	Higher education completed during Soviet period	Bakalaura grāds (profesionālais vai akadēmiskais)
LV-R4-10	8.0	213	195	5	7	16.41	1.21	1.32	76.62	Higher education completed during Soviet period	Bakalaura grāds (profesionālais vai akadēmiskais)
LV-R3-08	9.0	109	86	5	6	15.92	1.49	1.65	81.26	Bachelor	Maāistra grāds (profesionālais vai akadēmiskais)
LV-R4-08	9.0	139	117	5	6	16.60	1.55	1.65	81.26	Bachelor	Maģistra grāds (profesionālais vai akadēmiskais)
LV-R3-09	10.0	43	40	5	7	17.91	2.08	2.19	87.15	Masters	Augstākā izglītība iegūta padomju laikā
LV-R4-09	10.0	56	56	5	7	18.50	1.98	2.19	87.15	Masters	Augstākā izglītība iegūta padomju laikā
LV-R3-11	11.0	4	4	5	7	21.67	2.29	2.44	89.32	Doctoral degree	Doktora grāds
LV-R4-11	11.0	3	2	5	7	20.50	2.18	2.44	89.32	Doctoral degree	Doktora grāds
NETHERLANDS											
NL-R1-01	1.0	19	17	1	1	7.18	-2.07	-1.94	16.55	Not completed primary school	Niet voltooid lager onderwijs

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
NL-R2-01	1.0	23	12	1	1	5.75	-1.43	-1.94	16.55	Not completed primary school	Niet voltooid lager onderwijs
NL-R3-01	1.0	27	16	1	1	6.86	-1.91	-1.94	16.55	Not completed primary school	Niet voltooid lager onderwijs
NL-R4-01	1.0	8	4	1	1	6.33	-2.16	-1.94	16.55	Niet voltooid lager onderwijs	Niet voltooid lager onderwijs
NL-R1-02	2.0	234	126	1	1	7.79	-1.35	-1.52	22.98	Primary school or first stage of basic education	Lager onderwijs, basisschool, lager speciaal onderwijs
NL-R2-02	2.0	226	135	1	1	7.96	-1.34	-1.52	22.98	Primary school or first stage of basic education	Lager onderwijs, basisschool, lager speciaal onderwijs
NL-R3-02	2.0	195	109	1	1	7.77	-1.64	-1.52	22.98	Primary school or first stage of basic education	Lager onderwijs, basisschool, lager speciaal onderwijs
NL-R4-02	2.0	172	85	1	1	8.24	-1.67	-1.52	22.98	Lager onderwijs [LO], Basisschool, Lager speciaal onderwijs	Lager onderwijs (LO), Basisschool, Lager speciaal onderwijs
NL-R1-03	3.0	436	384	2	2	10.23	-1.09	-1.18	29.34	Lower secondary school, technical training [lbo]	Lager beroepsonderwijs, lagere technische school, nijverheidsonderwijs, huishoudschool
NL-R2-03	3.0	309	266	2	2	9.84	-1.09	-1.18	29.34	Lower secondary school, technical training [lbo]	Lager beroepsonderwijs, lagere technische school, nijverheidsonderwijs, huishoudschool, VMBO basisberoepsgerichte of kaderberoepsgerichte leerweg
NL-R3-03	3.0	286	229	2	2	10.03	-1.11	-1.18	29.34	Lower secondary school, technical training (lbo)	Lager beroepsonderwijs, lagere technische school, nijverheidsonderwijs, huishoudschool, VMBO basisberoepsgerichte of kaderberoepsgerichte leerweg
NL-R4-03	3.0	258	222	2	2	10.03	-1.35	-1.18	29.34	Lager Beroepsonderwijs [LBO], Lagere Technische School [LTS]	Lager Beroepsonderwijs (LBO), Lagere Technische School (LTS), Nijverheidsonderwijs, Huishoudschool, Voorbereidend Middelbaar Beroepsonderwijs (VMBO): basisberoepsgerichte of kaderberoepsgerichte leerweg
NL-R1-04	4.0	321	260	2	2	11.19	-0.40	-0.47	45.27	Lower secondary school, theoretical training [mulo,mavo]	MULO, ULO, MAVO
NL-R2-04	4.0	263	208	2	2	10.48	-0.46	-0.47	45.27	Lower secondary school, theoretical training [mulo,mavo]	MULO, ULO, MAVO, VMBO theoretische of gemengde leerweg
NL-R3-04	4.0	224	179	2	2	11.46	-0.45	-0.47	45.27	Lower secondary school, theoretical training (mulo,mavo)	MULO, ULO, MAVO, VMBO theoretische of gemengde leerweg
NL-R4-04	4.0	230	178	2	2	11.44	-0.55	-0.47	45.27	Middelbaar Algemeen Voortgezet Onderwijs [MAVO]	Middelbaar Algemeen Voortgezet Onderwijs (MAVO), (Meer) Uitgebreid Lager Onderwijs (MULO, ULO), Voorbereidend Middelbaar Beroepsonderwijs (VMBO): theoretische of gemengde leerweg
NL-R1-05	5.0	39	36	2	2	12.86	-0.44	-0.45	45.70	Short upper secondary professional education [kmbo, vhbo]	KMBO, VHBO

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
NL-R2-05	5.0	20	19	2	2	12.00	-0.08	-0.45	45.70	Short upper secondary professional education (kmbo, vhbo)	KMBO, VHBO
NL-R3-05	5.0	65	57	2	2	12.47	-0.32	-0.45	45.70	Short upper secondary professional education (kmbo, vhbo)	Kort MBO (KMBO)
NL-R4-05	5.0	30	29	2	2	12.93	-0.91	-0.45	45.70	Kort Middelbaar Beroepsonderwijs [KMBO]	Kort Middelbaar Beroepsonderwijs (KMBO)
NL-R1-06	6.0	412	378	3	3	13.37	-0.04	-0.16	52.70	Upper secondary professional education [mbo]	Middelbaar beroepsonderwijs
NL-R2-06	6.0	291	269	3	3	12.55	-0.17	-0.16	52.70	Upper secondary professional education [mbo]	Middelbaar beroepsonderwijs, MBO beroepsopleidende leerweg
NL-R3-06	6.0	318	276	3	3	13.33	-0.24	-0.16	52.70	Upper secondary professional education (mbo)	Middelbaar beroepsonderwijs (MBO), Beroepsopleidende leerweg (BOL), Beroepsbegeleidende leerweg (BBL)
NL-R4-06	6.0	304	255	3	3	13.10	-0.24	-0.16	52.70	Middelbaar Beroepsonderwijs [MBO], Beroepsopleidende leerweg	Middelbaar Beroepsonderwijs (MBO), Beroepsopleidende leerweg (BOL), Beroepsbegeleidende leerweg (BBL)
NL-R1-08	7.0	101	77	3	4	13.43	0.17	0.25	62.30	Higher secondary school [mms, havo]	MMS, HAVO
NL-R2-08	7.0	87	64	3	4	12.84	0.19	0.25	62.30	Higher secondary school [mms, havo]	MMS, HAVO
NL-R3-08	7.0	98	65	3	4	13.63	0.32	0.25	62.30	Higher secondary school (mms, havo)	MMS, HAVO, VHBO
NL-R4-08	7.0	131	105	3	4	14.87	0.26	0.25	62.30	Hoger Algemeen Voortgezet Onderwijs [HAVO]	Hoger Algemeen Voortgezet Onderwijs (HAVO), Vooropleiding Hoger Beroepsonderwijs (VHBO), Middelbare Meisjesschool (MMS)
NL-R1-07	8.0	141	122	4	4	13.94	0.36	0.35	64.58	Post secondary, non-tertiary education [mbo plus]	MBO-plus voor toegang tot het HBO, korte HBO-opleiding (korter dan 2 jaar)
NL-R2-07	8.0	111	99	4	4	13.57	0.17	0.35	64.58	Post secondary, non-tertiary education [mbo plus]	MBO-plus voor toegang tot het HBO, korte HBO-opleiding (korter dan 2 jaar)
NL-R3-07	8.0	134	125	4	4	15.06	0.49	0.35	64.58	Post secondary, non-tertiary education (mbo plus)	MBO-plus voor toegang tot het HBO, korte HBO-opleiding (korter dan 2 jaar)
NL-R4-07	8.0	95	83	4	4	14.34	0.26	0.35	64.58	MBO-plus voor toegang tot het HBO korte HBO-opleiding	MBO-plus voor toegang tot het HBO, korte HBO-opleiding (korter dan 2 jaar)
NL-R1-09	9.0	106	68	3	4	13.49	0.57	0.70	71.92	Pre-scientific secondary school [hbs, vwo]	HBS, VWO, gymnasium, atheneum
NL-R2-09	9.0	84	61	3	4	13.75	0.80	0.70	71.92	Pre-scientific secondary school [hbs, vwo]	HBS, VWO, gymnasium, atheneum
NL-R3-09	9.0	73	47	3	4	14.02	0.58	0.70	71.92	Pre-scientific secondary school (hbs, vwo)	HBS, VWO, gymnasium, atheneum

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
NL-R4-09	9.0	73	39	3	4	14.32	0.79	0.70	71.92	Voorbereidend Wetenschappelijk Onderwijs [VWO]	Voorbereidend Wetenschappelijk Onderwijs (VWO), Gymnasium, Atheneum, Hogere Burgerschool (HBS)
NL-R1-10	10.0	378	353	5	6	16.12	1.02	1.03	77.93	Tertiary professional education [hbo]	Hoger beroepsonderwijs, kweekschool, conservatorium, MO-akten, nieuwe stijl hoge scholen
NL-R2-10	10.0	313	290	5	6	15.46	1.04	1.03	77.93	Tertiary professional education [hbo]	Hoger beroepsonderwijs, kweekschool, conservatorium, MO-akten, nieuwe stijl hoge scholen
NL-R3-10	10.0	294	276	5	6	16.29	0.96	1.03	77.93	Tertiary professional education (hbo)	Hoger beroepsonderwijs, kweekschool, conservatorium, MO-akten, nieuwe stijl hoge scholen
NL-R4-10	10.0	300	264	5	6	16.14	0.96	1.03	77.93	Hoger Beroepsonderwijs [HBO]	Hoger Beroepsonderwijs (HBO), Kweekschool, Conservatorium, MO-akten, nieuwe stijl hogescholen
NL-R1-11	11.0	141	131	5	7	18.41	1.88	1.70	87.13	Tertiary scientific education, university	Wetenschappelijk onderwijs, universiteit, technische/economische hogeschool oude stijl
NL-R2-11	11.0	121	114	5	7	18.20	1.57	1.70	87.13	Tertiary scientific education, university	Wetenschappelijk onderwijs, universiteit, technische/economische hogeschool oude stijl
NL-R3-11	11.0	145	134	5	7	18.77	1.53	1.70	87.13	Tertiary scientific education, university	Wetenschappelijk onderwijs, universiteit, technische/economische hogeschool oude stijl
NL-R4-11	11.0	134	126	5	7	18.50	1.61	1.70	87.13	Wetenschappelijk Onderwijs [WO]	Wetenschappelijk Onderwijs (WO), Universiteit, Technische/Economische Hogeschool oude stijl
NL-R1-12	12.0	23	18	5	7	18.81	2.05	2.07	90.63	Tertiary post-scientific education [teachers, doctors]	Postdoctorale opleiding (leraren- en beroepsopleidingen zoals medici, apotheker)
NL-R2-12	12.0	19	19	5	7	17.72	2.41	2.07	90.63	Tertiary post-scientific education (teachers, doctors)	Postdoctorale opleiding (leraren- en beroepsopleidingen zoals medici, apotheker)
NL-R3-12	12.0	21	20	5	7	18.84	1.69	2.07	90.63	Tertiary post-scientific education (teachers, doctors)	Postdoctorale opleiding (leraren- en beroepsopleidingen zoals medici, apotheker)
NL-R4-12	12.0	29	27	5	7	18.78	1.92	2.07	90.63	Postdoctorale opleiding	Postdoctorale opleiding (leraren- en beroepsopleidingen zoals medici, apotheker)
NL-R1-13	13.0	9	8	5	7	18.88	2.43	2.69	94.62	Second stage of tertiary education, Ph.D. education	Aio/Oio of andere promotie-opleiding tot graad van doctor
NL-R2-13	13.0	10	10	5	7	19.25	1.85	2.69	94.62	Second stage of tertiary education, Ph D education	Aio/Oio of andere promotie-opleiding tot graad van doctor
NL-R3-13	13.0	6	5	5	7	20.75	3.13	2.69	94.62	Second stage of tertiary education, Ph.D. education	Aio/Oio of andere promotie-opleiding tot graad van doctor
NL-R4-13	13.0	13	12	5	7	20.44	3.19	2.69	94.62	Aio-Oio of andere promotie-opleiding tot graad van doctor	Aio/Oio of andere promotie-opleiding tot graad van doctor
NORWAY											
NO-R1-00	0.0	1	1	1	1	11.00	-0.27	-2.35	15.08	No education	Ingen utdanning

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
NO-R2-00	0.0	5	2	1	1	2.00	-3.04	-2.35	15.08	No education	Ingen utdanning
NO-R3-00	0.0	19	4	1	1	4.25	-2.00	-2.35	15.08	No education	Ikke fullført folkeskole/grunnskole
NO-R4-01	0.0	5	2	1	1	6.50	-2.54	-2.35	15.08	Ingen utdanning eller f?rskoleutdanning	Ingen utdanning eller førskoleutdanning
NO-R1-01	1.0	1	1	1	1	10.00		-1.18	33.52	Primary education [1st. - 7th. class level]	Barneskole/ folkeskole
NO-R4-02	1.0	26	4	1	1	7.00	-1.08	-1.18	33.52	Barneskole [første del av obligatorisk utdanning]	Barneskole (første del av obligatorisk utdanning)
NO-R1-02	2.0	296	205	2	2	8.98	-1.14	-1.34	30.44	Lower secondary education [8th. - 10th. class level]	Ungdomsskole
NO-R2-02	2.0	385	268	2	2	9.17	-1.16	-1.34	30.44	Lower secondary education	Ungdomsskole/Framhaldskole/grunnskole, Ettårig og toårig utdanning etter folkeskole
NO-R3-02	2.0	314	191	2	2	9.13	-1.30	-1.34	30.44	Lower secondary education	Ungdomsskole/Framhaldskole/grunnskole, Ettårig og toårig utdanning etter folkeskole
NO-R4-03	2.0	201	128	2	2	8.84	-1.40	-1.34	30.44	Ungdomsskole [grunnskole, 7-årig folkeskole, framhaldsskole]	Ungdomsskole (grunnskole, 7-årig folkeskole, framhaldsskole)
NO-R1-03	3.0	598	453	3	3	11.55	-0.71	-0.82	40.94	Upper secondary, basic [11th. - 12th. class level]	Yrkesskole/handelsskole
NO-R2-03	3.0	278	211	3	3	11.39	-0.75	-0.82	40.94	Upper secondary, basic [11th - 12th class level]	Videregående grunnutdanning/Realskole, Grunnkurs og VKI videregående utdanning
NO-R3-03	3.0	285	189	3	3	11.56	-0.77	-0.82	40.94	Upper secondary, basic (11th. - 12th. class level)	Videregående grunnutdanning/Realskole, Grunnkurs og VKI videregående utdanning
NO-R4-04	3.0	282	198	3	3	11.26	-0.83	-0.82	40.94	Videregående grunnutdanning [grunnkurs, VK1, folkehøyskole, realskole, ettørig eller toørig utdanning etter folkeskole]	Videregående grunnutdanning (grunnkurs, VK I, folkehøgskole, realskole, ettårig og toårig utdanning etter folkeskole)
NO-R1-04	4.0	493	374	3	4	13.39	-0.04	-0.34	51.77	Upper secondary, final year [13th. class level+]	Videregående/gymnas
NO-R2-04	4.0	321	218	3	4	12.72	-0.31	-0.34	51.77	Upper secondary, final year [13th class level+]	Videregående avsluttende utdanning, VK II og VK III, gammel gymnasutdanning
NO-R3-04	4.0	331	240	3	4	13.03	-0.42	-0.34	51.77	Upper secondary, final year (13th. class level+)	Videregående avsluttende utdanning, VK II og VK III, gammel gymnasutdanning
NO-R4-05	4.0	350	260	3	4	12.97	-0.53	-0.34	51.77	Videregående avsluttende utdanning [VK2, VK3, gymnas, fagpr?ve, p?bygging til studiekompetanse]	Videregående avsluttende utdanning (VK II, VK III, gymnas, fagprøve, påbygging til studiekompetanse)
NO-R1-05	5.0	52	43	4	5	14.07	0.07	-0.22	54.36	Post-secondary non-tertiary education [14th. class level+]	Lærerskole/sykepleieskole

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
NO-R2-05	5.0	154	130	4	5	13.14	-0.10	-0.22	54.36	Post-secondary non-tertiary education [14th class level+]	Påbygging til videregående utdanning, Teknisk fagskole
NO-R3-05	5.0	173	147	4	5	13.62	-0.24	-0.22	54.36	Post-secondary non-tertiary education (14th. class level+)	Påbygging til videregående utdanning, Teknisk fagskole
NO-R4-06	5.0	114	98	4	5	12.94	-0.35	-0.22	54.36	Teknisk fagskole, godkjent fagskole eller forkurs som ikke gir studiepoeng-vekttall	Teknisk fagskole, godkjent fagskole eller forkurs som ikke gir studiepoeng/vekttall
NO-R1-06	6.0	448	402	5	6	16.38	0.96	0.80	74.73	First stage tertiary, undergrad level [14th-17th level]	Påbegynt universitet/høyskole uten eksamen
NO-R2-06	6.0	380	334	5	6	15.85	0.64	0.80	74.73	Tertiary education, short [higher education 4 years or short	Universitet/høgskole, 4 år eller mindre med eksamen, Lærerskole, sykepleieskole, Cand mag, Ingeniør
NO-R3-06	6.0	372	317	5	6	15.64	0.63	0.80	74.73	Tertiary education, short (higher education 4 years or shorter)	Universitet/høgskole, 4 år eller mindre med eksamen, Lærerskole, sykepleieskole, Cand mag, Ingeniør
NO-R4-07	6.0	345	296	5	6	15.91	0.73	0.80	74.73	Universitet-høyskole, 4 år eller mindre med eksamen [bachelor, cand mag, l?rerskole, sykepleieskole, ingeni?r, ivil?kon	Universitet/høgskole, 4 år eller mindre med eksamen (bachelorgrad, cand.mag., lærerskole, sykepleieskole, ingeniør, siviløkonom)
NO-R1-07	7.0	103	103	5	7	18.68	1.81	1.67	86.58	First stage tertiary, undergraduate [18th-19th level]	Universitet/høyskole, kortere enn fem år, med eksamen
NO-R2-07	7.0	218	204	5	7	18.05	1.58	1.67	86.58	Tertiary education, long [higher education more than 4 years	Universitet/Høyskole, mer enn 4 år med eksamen, Hovedfag, Mastergrad, Sivilingeniør, Siviløkonom
NO-R3-07	7.0	234	221	5	7	18.17	1.45	1.67	86.58	Tertiary education, long (higher education more than 4 years)	Universitet/Høyskole, mer enn 4 år med eksamen, Hovedfag, Mastergrad, Sivilingeniør, Siviløkonom
NO-R4-08	7.0	200	196	5	7	18.30	1.53	1.67	86.58	Universitet-høyskole, mer enn 4 år med eksamen [mastergrad, hovedfag, sivilingeni?r, sivil?konom h?yere avdeling]	Universitet/Høyskole, mer enn 4 år med eksamen (mastergrad, hovedfag, sivilingeniør, siviløkonom høyere avdeling)
NO-R1-08	8.0	12	11	5	7	19.50	1.71	2.28	91.75	Second stage tertiary [postgraduate] [20th level+]	Universitet/høyskole, fem år eller mer, med eksamen
NO-R2-08	8.0	17	15	5	7	20.00	2.68	2.28	91.75	Doctoral Degree	Forskernivå, Dr grad
NO-R3-08	8.0	18	15	5	7	21.71	2.40	2.28	91.75	Doctoral Degree	Forskernivå, Dr grad
NO-R4-09	8.0	20	17	5	7	21.33	1.63	2.28	91.75	Forskernivå [Dr grad, Ph D]	Forskernivå (Dr. grad, Ph.D)
POLAND											
PL-R1-01	1.0	75	41	1	1	4.00	-1.77	-1.71	19.31	Not completed primary education	Nieukończone podstawowe

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
PL-R2-01	1.0	32	13	1	1	4.17	-1.78	-1.71	19.31	Not completed primary education	Nieukończone podstawowe
PL-R3-01	1.0	48	17	1	1	4.67	-1.89	-1.71	19.31	Not completed primary education	Nieukończone podstawowe
PL-R4-01	1.0	35	8	1	1	4.38	-1.86	-1.71	19.31	Not completed primary [compulsory] education	Nieukończone podstawowe
PL-R1-02	2.0	433	275	2	2	7.47	-1.20	-1.15	27.65	Primary completed	Ukończone podstawowe
PL-R2-02	2.0	329	226	2	2	7.53	-1.17	-1.15	27.65	Primary completed	Ukończone podstawowe
PL-R3-02	2.0	328	247	2	2	7.79	-1.19	-1.15	27.65	Primary completed	Ukończone podstawowe
PL-R4-02	2.0	271	185	2	2	7.71	-1.31	-1.15	27.65	Primary completed	Ukończone podstawowe
PL-R2-03	3.0	113	1	2	2	11.00	0.33	-0.56	38.43	Lower secondary	Gimnazjalne
PL-R3-03	3.0								38.43	Lower secondary	Gimnazjalne
PL-R4-03	3.0								38.43	Lower secondary	Gimnazjalne
PL-R1-04	4.0	517	431	3	3	10.61	-0.54	-0.56	38.43	Basic vocational	Zasadnicze zawodowe (także 2-letnia SPR)
PL-R2-04	4.0	448	402	3	3	10.71	-0.53	-0.56	38.43	Basic vocational	Zasadnicze zawodowe (także 2-letnia SPR)
PL-R3-04	4.0	452	403	3	3	10.77	-0.54	-0.56	38.43	Basic vocational	Zasadnicze zawodowe (także 2-letnia SPR)
PL-R4-04	4.0	358	320	3	3	10.72	-0.81	-0.56	38.43	Basic vocational	Zasadnicze zawodowe (także 2-letnia SPR)
PL-R1-07	5.0	419	326	3	4	12.80	0.24	0.18	53.76	Secondary vocational	Średnie zawodowe (technikum, liceum zawodowe lub liceum techniczne)
PL-R2-06	5.0	354	292	3	4	12.85	0.24	0.18	53.76	Secondary vocational	Średnie zawodowe (technikum, liceum zawodowe, techniczne lub profilowane)
PL-R3-06	5.0	331	274	3	4	12.93	0.29	0.18	53.76	Secondary vocational	Średnie zawodowe (technikum, liceum zawodowe, techniczne lub profilowane)
PL-R4-06	5.0	303	243	3	4	13.00	-0.01	0.18	53.76	Secondary vocational	Średnie zawodowe (technikum, liceum zawodowe, techniczne lub profilowane)
PL-R2-05	6.0	163	84	3	4	12.45	0.29	0.26	55.09	Secondary comprehensive	Średnie ogólnokształcące

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
PL-R3-05	6.0	154	74	3	4	12.70	0.44	0.26	55.09	Secondary comprehensive	Średnie ogólnokształcące
PL-R4-05	6.0	173	89	3	4	12.55	0.14	0.26	55.09	Secondary comprehensive	Średnie ogólnokształcące
PL-R1-05	6.1	86	25	2	2	11.44	-0.24	-0.23	45.17	Secondary not completed	Nieukończone średnie (ukończone co najmniej 2 lata nauki)
PL-R1-06	6.2	136	87	3	4	11.86	0.37	0.34	57.07	Secondary comprehensive	Średnie ogólnokształcące
PL-R1-08	7.0	90	74	4	5	14.20	0.77	0.72	64.62	Post secondary	Pomaturalne, policealne
PL-R2-07	7.0	78	67	4	5	14.49	0.67	0.72	64.62	Post secondary	Pomaturalne, policealne
PL-R3-07	7.0	70	60	4	5	14.25	0.99	0.72	64.62	Post secondary	Pomaturalne, policealne
PL-R4-07	7.0	82	65	4	5	14.25	0.67	0.72	64.62	Post secondary	Pomaturalne, policealne
PL-R1-09	8.0	50	38	5	6	16.76	1.28	1.31	74.79	First stage of tertiary	Licencjackie, inżynierskie
PL-R2-08	8.0	46	33	5	6	16.64	1.74	1.31	74.79	First stage of tertiary	Licencjackie, inżynierskie
PL-R3-08	8.0	47	33	5	6	16.03	1.14	1.31	74.79	First stage of tertiary	Licencjackie, inżynierskie
PL-R4-08	8.0	75	60	5	6	16.75	1.39	1.31	74.79	Higher professional	Licencjackie, inżynierskie
PL-R2-09	9.0	149	138	5	7	17.72	2.23	1.97	83.81	Tertiary completed	Wyższe magisterskie lub lekarskie
PL-R3-09	9.0	159	152	5	7	17.57	2.23	1.97	83.81	Tertiary completed	Wyższe magisterskie lub lekarskie
PL-R4-09	9.0	210	197	5	7	17.91	1.86	1.97	83.81	University	Wyższe magisterskie lub lekarskie
PL-R1-10	9.1	50	24	3	5	16.33	1.63	1.53	78.22	Tertiary not completed	Nieukończone wyższe magisterskie lub lekarskie (ukończone co najmniej 2 lata nauki)
PL-R1-11	9.2	196	179	5	7	17.63	2.17	2.05	84.67	Tertiary completed	Ukończone wyższe magisterskie lub lekarskie
PL-R4-10	10.0	6	5	5	7	19.40	3.56	3.36	94.28	Doctoral degree or higher degree-title	Posiada stopień naukowy doktora, doktora habilitowanego lub tytuł profesora

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
PORTUGAL											
PT-R1-01	1.0	198	134	1		1.27	-1.21	-1.03	7.34	Nenhum	Nenhum
PT-R2-01	1.0	257	158	1		1.52	-1.19	-1.03	7.34	Nenhum	Nenhum
PT-R3-01	1.0	308	156	1		1.14	-0.98	-1.03	7.34	Nenhum	Nenhum
PT-R4-01	1.0	251	118	1	1	1.02	-1.15	-1.03	7.34	None	Nenhum
PT-R1-02	2.0	476	416	1		4.04	-0.77	-0.67	10.83	1 ciclo	1º ciclo do básico (4ª classe)
PT-R2-02	2.0	679	572	1		4.01	-0.67	-0.67	10.83	1 ciclo	1º ciclo do básico (4ª classe)
PT-R3-02	2.0	791	672	1		4.07	-0.71	-0.67	10.83	1 ciclo	1º ciclo do básico (4ª classe)
PT-R4-02	2.0	801	603	1	1	4.09	-0.83	-0.67	10.83	Basic Level 1[primary school - 4th year]	Ensino Básico 1 (até à 4ª classe, instrução primária (3º ou 4º ano)
PT-R1-03	3.0	200	155	1		6.35	-0.38	-0.37	15.02	2 ciclo	2º ciclo do básico (5º e 6º anos / preparatório)
PT-R2-03	3.0	274	234	1		6.24	-0.40	-0.37	15.02	2 ciclo	2º ciclo do básico (5º e 6º anos / preparatório)
PT-R3-03	3.0	255	213	1		6.33	-0.39	-0.37	15.02	2 ciclo	2º ciclo do básico (5º e 6º anos / preparatório)
PT-R4-03	3.0	275	226	1	1	6.68	-0.46	-0.37	15.02	Basic level 2 [preparatory school, 5th and 6th years]	Ensino Básico 2 (preparatório/5º e 6º anos / 5ª ou 6ª classe, 1º ciclo dos liceus ou do ensino técnico comercial ou industrial)
PT-R1-04	4.0	261	175	2		9.51	0.38	0.15	24.90	3 ciclo	3º ciclo do básico (9º ano / 5º ano dos liceus)
PT-R2-04	4.0	304	205	2		9.27	0.24	0.15	24.90	3 ciclo	3º ciclo do básico (9º ano / 5º ano dos liceus)
PT-R3-04	4.0	293	211	2		9.44	0.04	0.15	24.90	3 ciclo	3º ciclo do básico (9º ano / 5º ano dos liceus)
PT-R4-04	4.0	405	287	2	2	9.35	0.04	0.15	24.90	Basic level 3 [9th year- previous 5th year of high school]	Ensino Básico 3 (até ao 9º ano/5º ano dos liceus, escola comercial / industrial, 2º ciclo dos liceus ou do ensino técnico comercial ou industrial)
PT-R1-05	5.0	216	147	3		12.35	0.97	0.76	39.94	Secundario	Secundário (12º ano / 7º ano dos liceus ou equivalente Propedêutico / serviço cívico)

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
PT-R2-05	5.0	320	202	3		12.35	0.77	0.76	39.94	Secundario	Secundário (12º ano / 7º ano dos liceus ou equivalente Propedêutico / serviço cívico)
PT-R3-05	5.0	340	244	3		12.42	0.77	0.76	39.94	Secundario	Secundário (12º ano / 7º ano dos liceus ou equivalente Propedêutico / serviço cívico)
PT-R4-05	5.1	50	35	3	3	12.52	0.90	0.83	43.06	Secondary Education - Vocational Training	Ensino Secundário Cursos Tecnológicos
PT-R4-06	5.2	296	191	3	4	12.19	0.65	0.61	36.53	Secondary School [12th year- previous 7th year of high school]	Ensino Secundário Cursos Gerais (12º/7º ano dos liceus completo, propedêutico, serviço cívico)
PT-R1-06	6.0	25	23	5		15.26	1.47	1.34	58.38	Superior Politecnico	Superior politécnico
PT-R2-06	6.0	23	20	5		15.75	1.46	1.34	58.38	Superior politecnico	Superior politécnico
PT-R3-06	6.0	31	21	5		14.90	1.68	1.34	58.38	Superior politecnico	Superior politécnico
PT-R4-07	6.0	15	14	4	5	14.64	1.06	1.34	58.38	Training in Technological Specialization	Cursos de Especialização Tecnológica
PT-R1-07	7.0	123	105	5		16.51	2.40	2.26	79.80	Superior Universitario	Superior universitário
PT-R2-07	7.0	177	144	5		16.82	2.51	2.26	79.80	Superior universitario	Superior universitário
PT-R3-07	7.0	177	150	5		16.91	2.46	2.26	79.80	Superior universitario	Superior universitário
PT-R4-08	7.1	34	27	5	6	16.07	2.04	1.87	72.88	Tertiary Education - Bachelor	Ensino Superior – Bacharelato (Pós 25 Abril, Politécnico)
PT-R4-09	7.2	208	181	5	7	17.17	2.27	2.08	77.62	Tertiary Education - Degree	Ensino Superior – Licenciatura
PT-R1-08	8.0	12	10	5		19.00	3.74	3.67	93.90	Mestrado-Doutoramento	Mestrado/Doutoramento
PT-R2-08	8.0	16	14	5		19.07	3.91	3.67	93.90	Mestrado|Doutoramento	Mestrado/Doutoramento
PT-R3-08	8.1	12	11	5		17.55	5.42	3.67	95.97	Pós-graduação	Pós-graduação (pelo menos 1 ano)
PT-R3-09	8.2	9	9	5		19.00	2.70	3.67	88.40	Mestrado	Mestrado
PT-R4-10	8.2	18	18	5	7	19.44	2.58	2.37	83.05	Tertiary Education - Master [Before Bologna]	Ensino Superior – Mestrado (PréBolonha)
PT-R4-11	8.2	6	4	5	7	19.50	2.46	2.26	81.11	Tertiary Education - Master [After Bologna]	Ensino Superior – Mestrado (Pós-Bolonha)

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
PT-R3-10	8.3	3	3	5		21.00	4.39	4.02	96.72	Doutoramento	Doutoramento
PT-R4-12	8.3	8	7	5	7	23.80	4.11	3.77	96.72	Tertiary Education - PhD	Ensino Superior – Doutoramento
ROMANIA											
RO-R3-01	1.0	44	29	1	1	0.00	-1.52	-1.66	15.42	No school	Fara scoala
RO-R4-01	1.0	38	26	1	1	4.27	-1.58	-1.66	15.42	No school	Fara scoala
RO-R3-02	2.0	244	163	1	1	4.34	-1.31	-1.35	19.54	Primary school	Scoala primara
RO-R4-02	2.0	172	91	1	1	4.37	-1.15	-1.35	19.54	Primary school	Scoala primara
RO-R3-03	3.0	439	270	2	2	8.00	-0.85	-0.70	30.90	General school (or lower secondary)	Gimnaziu
RO-R4-03	3.0	562	439	2	2	10.06	-0.53	-0.70	30.90	General school (or lower secondary)	Gimnaziu
RO-R3-04	4.0	445	380	3	3	10.72	-0.54	-0.61	32.75	Vocational and apprenticeship school	Scoala profesioanla ori de meserii
RO-R4-04	4.0	350	279	3	3	10.03	-0.62	-0.61	32.75	Vocational and apprenticeship school	Scoala profesioanla ori de meserii
RO-R3-05	5.0	543	399	3	4	12.13	0.21	0.24	51.77	High school (Upper secondary)	Liceu
RO-R4-05	5.0	619	472	3	4	12.19	0.20	0.24	51.77	High school (Upper secondary)	Liceu
RO-R3-06	6.0	175	148	4	5	14.25	0.58	0.89	66.45	Post-high school and 2 or 3 years colleges	Scoala post-liceala (inclusiv colegiu)
RO-R4-06	6.0	98	83	4	5	15.52	1.21	0.89	66.45	Post-high school and 2 or 3 years colleges	Scoala post-liceala (inclusiv colegiu)
RO-R3-07	7.0	202	182	5	6	16.87	2.15	1.80	82.25	University degree (4 or 5 years colleges)	Studii superioare/facultate
RO-R4-07	7.0	263	230	5	6	16.89	1.25	1.80	82.25	University degree (4 or 5 years colleges)	Studii superioare/facultate
RO-R3-08	8.0	41	40	5	7	19.25	2.77	2.79	92.12	Post-graduate degree	Studii post-universitare
RO-R4-08	8.0	21	21	5	7	20.10	2.15	2.79	92.12	Post-graduate degree	Studii post-universitare

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
RUSSIA											
RU-R3-00	0.0	4	1	1	1	0.00	-1.99	-1.95	21.13	No formal education	*Not documented*
RU-R3-01	1.0	205	102	1	1	5.75	-1.93	-1.80	22.95	Primary education	Начальное образование (7 классов средней школы или меньше)
RU-R4-01	1.0	193	87	1	1	6.45	-1.73	-1.80	22.95	Primary education	Начальное образование (7 классов средней школы или меньше)
RU-R3-02	2.0	198	91	2	2	8.03	-1.45	-1.43	28.09	Incomplete high school	Незаконченная средняя школа
RU-R4-02	2.0	182	94	2	2	8.11	-1.47	-1.43	28.09	Incomplete high school	Незаконченная средняя школа
RU-R3-03	3.0	100	81	2	2	9.95	-1.16	-1.14	32.63	Professional education without secondary education	ПТУ, ФЗУ, ФЗО, лицей без среднего образования
RU-R4-03	3.0	56	40	2	2	9.20	-1.17	-1.14	32.63	Professional education without secondary education	ПТУ, ФЗУ, ФЗО, лицей без среднего образования
RU-R3-04	4.0	405	262	3	4	10.47	-0.62	-0.66	40.84	Completed secondary school	Законченная средняя школа
RU-R4-04	4.0	373	269	3	4	10.54	-0.72	-0.66	40.84	Completed secondary school	Законченная средняя школа
RU-R3-05	5.0	229	185	3	3	11.58	-0.48	-0.61	41.62	Professional education on secondary level	ПТУ, лицей со средним образованием или техническое училище (обучение 2-3 года)
RU-R4-05	5.0	300	256	3	3	11.69	-0.73	-0.61	41.62	Professional education on secondary level	ПТУ, лицей со средним образованием или техническое училище (обучение 2-3 года)
RU-R3-06	6.0	666	567	5	5	12.76	-0.06	-0.11	50.68	Special technical education	Среднее специальное образование: техникум, училище, колледж
RU-R4-06	6.0	689	591	5	5	12.80	-0.17	-0.11	50.68	Special technical education	Среднее специальное образование: техникум, училище, колледж
RU-R3-07	7.0	105	44	3	4	14.61	0.75	0.76	66.09	Several grades of college with no certificate	Несколько курсов вуза, но без диплома
RU-R4-07	7.0	94	36	3	4	14.58	0.82	0.76	66.09	Several grades of college with no certificate	Несколько курсов вуза, но без диплома
RU-R3-10	8.0	488	430	5	7	15.99	1.42	1.40	75.73	Completed college by 5-6 grade system	Законченное высшее образование по 5-6 летней системе (диплом специалиста)
RU-R4-10	8.0	602	525	5	7	15.93	1.44	1.40	75.73	Completed college by 5-6 grade system	Законченное высшее образование по 5-6 летней системе (диплом специалиста)
RU-R3-08	9.0	5	1	5	6	17.00	2.51	1.57	77.84	Bachelor degree from college	Получил диплом бакалавра

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
RU-R4-08	9.0	6	1	5	6	15.00	3.85	1.57	77.84	Bachelor degree from college	Получил диплом бакалавра
RU-R3-09	10.0	1	1	5	7	15.00		1.57	77.84	Master degree from college	Получил диплом магистра
RU-R4-09	10.0	8	7	5	7	16.00	1.15	1.57	77.84	Master degree from college	Получил диплом магистра
RU-R3-11	11.0	18	15	5	7	17.80	2.51	2.62	88.33	Post-college education without scientific degree	Постдипломное образование: аспирантура, докторантура, ординатура, адъюнктура - без научной степени
RU-R4-11	11.0	4	4	5	7	18.00	3.27	2.62	88.33	Post-college education without scientific degree	Постдипломное образование: аспирантура, докторантура, ординатура, адъюнктура - без научной степени
RU-R3-12	12.0	13	11	5	7	19.18	1.90	1.97	82.50	Scientific degree	Научная степень (кандидат, доктор наук)
RU-R4-12	12.0	3	3	5	7	19.33	2.43	1.97	82.50	Scientific degree	Научная степень (кандидат, доктор наук)
SWEDEN											
SE-R1-01	1.0	25	4	1		5.25	-1.73	-1.40	26.56	Not finished elementary school	Ej avslutad folkskola/grundskola
SE-R2-01	1.0	48	15	1		8.07	-0.97	-1.40	26.56	Not finished elementary school	Ej avslutad folkskola/grundskola
SE-R3-01	1.0	45	11	1		6.18	-1.33	-1.40	26.56	Ej avslutad folkskola/grundskola	Ej avslutad folkskola/grundskola
SE-R4-01	1.0	34	9	1		7.00	-1.52	-1.40	26.56	Ej avslutad folkskola-grundskola	Ej avslutad folkskola/grundskola
SE-R1-02	2.0	306	194	1		7.38	-1.28	-1.43	25.94	Elementary school, old	Folkskola
SE-R2-02	2.0	277	173	1		7.62	-1.19	-1.43	25.94	Elementary school, old	Folkskola
SE-R3-02	2.0	209	124	1		8.05	-1.41	-1.43	25.94	Folkskola	Folkskola
SE-R4-02	2.0	188	106	1		7.98	-1.49	-1.43	25.94	Folkskola	Folkskola
SE-R1-03	3.0	234	124	2		9.19	-0.83	-0.96	34.40	Elementary school	Grundskola/Enhetsskola
SE-R2-03	3.0	241	144	2		9.47	-0.82	-0.96	34.40	Elementary school	Grundskola/Enhetsskola
SE-R3-03	3.0	232	146	2		9.49	-0.94	-0.96	34.40	Grundskola/enhetsskola	Grundskola/Enhetsskola

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
SE-R4-03	3.0	181	94	2		9.43	-0.93	-0.96	34.40	Grundskola-Enhetsskola	Grundskola/Enhetsskola
SE-R1-04	4.0	75	59	2		10.27	-0.69	-0.77	38.10	Lower secondary and elementary school, old	Realskola/Flickskola
SE-R2-04	4.0	76	55	2		10.56	-0.73	-0.77	38.10	Lower secondary and elementary school, old	Realskola/Flickskola
SE-R3-04	4.0	71	55	2		11.20	-0.62	-0.77	38.10	Realskola/Flickskola	Realskola/Flickskola
SE-R4-04	4.0	55	31	2		10.67	-0.82	-0.77	38.10	Realskola-Flickskola	Realskola/Flickskola
SE-R1-05	5.0	44	39	2		11.26	-0.54	-0.81	37.39	Vocational school 1963-1970	Fackskola (1963-1970)
SE-R2-05	5.0	51	47	2		10.87	-0.76	-0.81	37.39	Vocational school 1963-1970	Fackskola (1963-1970)
SE-R3-05	5.0	45	40	2		11.60	-0.83	-0.81	37.39	Fackskola (1963-1970)	Fackskola (1963-1970)
SE-R4-05	5.0	31	27	2		11.30	-0.84	-0.81	37.39	Fackskola [1963-1970]	Fackskola (1963-1970)
SE-R1-06	6.0	269	261	2		11.31	-0.48	-0.68	39.93	2 year high school	2-årig gymnasielinje
SE-R2-06	6.0	229	213	2		11.53	-0.56	-0.68	39.93	2 year high school	2-årig gymnasielinje
SE-R3-06	6.0	251	227	2		11.52	-0.69	-0.68	39.93	2-årigt gymnasium	2-årig gymnasielinje
SE-R4-06	6.0	257	227	2		11.57	-0.77	-0.68	39.93	2-årig gymnasielinje, 2-årig yrkesskola	2-årig gymnasielinje, 2-årig yrkesskola
SE-R1-08	7.0	97	49	3		12.45	-0.23	-0.34	47.09	Vocational high school after 1992	Yrkesinriktat gymnasieprogram (efter 1992)
SE-R2-08	7.0	96	54	3		12.48	-0.34	-0.34	47.09	Vocational high school prior 1992	Yrkesinriktat gymnasieprogram (efter 1992)
SE-R3-08	7.0	94	56	3		12.98	-0.15	-0.34	47.09	Yrkesinriktat gymnasium (efter 1995)	Yrkesinriktat gymnasieprogram (efter 1992)
SE-R4-08	7.0	91	60	3		12.38	-0.47	-0.34	47.09	Yrkesinriktat gymnasium [efter 1992]	Yrkesinriktat gymnasieprogram (efter 1992)
SE-R1-07	8.0	270	214	3		12.75	-0.16	-0.13	51.60	3-4 year high school prior 1995	3- eller 4-årig gymnasielinje (före 1995)
SE-R2-07	8.0	286	229	3		12.58	0.00	-0.13	51.60	3-4 year high school prior 1995	3- eller 4-årig gymnasielinje (före 1995)

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
SE-R3-07	8.0	282	212	3		12.85	-0.09	-0.13	51.60	3- eller 4 årigt gymnasium (före 1995)	3- eller 4-årig gymnasielinje (före 1995)
SE-R4-07	8.0	300	221	3		12.86	-0.18	-0.13	51.60	3- eller 4 årig gymnasium [före 1995]	3- eller 4-årig gymnasielinje (före 1995)
SE-R1-09	9.0	63	17	3		13.29	-0.02	0.16	57.56	Theoretical high school after 1992	Teoretiskt inriktat gymnasieprogram (efter 1992) (t ex Samhällsvetarprogrammet eller Naturvetarprogrammet)
SE-R2-09	9.0	54	14	3		12.93	0.55	0.16	57.56	Theoretical high school after 1992	Teoretiskt inriktat gymnasieprogram (efter 1992) (t ex Samhällsvetarprogrammet eller Naturvetarprogrammet)
SE-R3-09	9.0	51	16	3		14.00	-0.29	0.16	57.56	Teoretiskt gymnasium (efter 1995)	Teoretiskt inriktat gymnasieprogram (efter 1992) (t ex Samhällsvetarprogrammet eller Naturvetarprogrammet)
SE-R4-09	9.0	54	15	3		13.40	0.45	0.16	57.56	Teoretiskt gymnasium [efter 1992]	Teoretiskt inriktat gymnasieprogram (efter 1992) (t ex Samhällsvetarprogrammet eller Naturvetarprogrammet)
SE-R1-10	10.0	171	115	3		14.04	0.76	0.84	70.79	University, no exam	Universitet/Högskola utan examen
SE-R2-10	10.0	145	96	3		14.46	0.88	0.84	70.79	University, no exam	Universitet/Högskola utan examen
SE-R3-10	10.0	147	101	3		14.63	0.91	0.84	70.79	Universitet/högskola ej examen	Universitet/Högskola utan examen
SE-R4-10	10.0	149	107	3		14.86	0.62	0.84	70.79	Universitet-/högskola utan examen	Universitet/Högskola utan examen
SE-R1-11	11.0	120	107	5		14.37	0.75	0.61	66.55	University, exam less than 3 years	Universitet/Högskola, kortare än 3 år, med examen
SE-R2-11	11.0	123	112	5		14.19	0.50	0.61	66.55	University, exam less than 3 years	Universitet/Högskola, kortare än 3 år, med examen
SE-R3-11	11.0	127	111	5		14.95	0.64	0.61	66.55	Universitet/högskola <3 år	Universitet/Högskola, kortare än 3 år, med examen
SE-R4-11	11.0	140	124	5		14.91	0.43	0.61	66.55	Universitet/Högskola, kortare än 3 år, med examen	Universitet/Högskola, kortare än 3 år, med examen
SE-R1-12	12.0	320	290	5		16.99	1.51	1.46	80.49	University, exam more than 3 years	Universitet/Högskola, 3 år eller längre, med examen
SE-R2-12	12.0	315	291	5		16.92	1.45	1.46	80.49	University, exam more than 3 years	Universitet/Högskola, 3 år eller längre, med examen
SE-R3-12	12.0	337	312	5		16.93	1.21	1.46	80.49	Universitet/Högskola, 3 år eller längre, med examen	Universitet/Högskola, 3 år eller längre, med examen
SE-R4-12	12.0	320	302	5		16.92	1.31	1.46	80.49	Universitet/Högskola, 3 år eller längre, med examen	Universitet/Högskola, 3 år eller längre, med examen
SE-R3-13	13.0	31	30	5		20.96	1.88	2.08	87.42	Forskarutbildning	Forskarutbildning.

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
SE-R4-13	13.0	22	21	5		20.26	2.01	2.08	87.42	Forskarutbildning	Forskarutbildning.
SLOVENIA											
SI-R1-00	0.0	78	65	1	1	5.84	-1.91	-1.89	15.24	Incomplete primary	nedokončana osnovna šola
SI-R2-00	0.0	69	48	1	1	5.62	-2.21	-1.89	15.24	Incomplete primary	nedokončana osnovna šola
SI-R3-01	0.0	48	37	1	1	5.20	-2.10	-1.89	15.24	Not completed primary education	nedokončana osnovna šola
SI-R4-00	0.0	38	22	1	1	5.86	-1.32	-1.89	15.24	Nedokoncana osnovna šola	nedokončana osnovna šola
SI-R1-01	1.0	378	225	2	2	7.99	-1.07	-1.13	25.81	Primary	dokončana osnovna šola
SI-R2-01	1.0	368	202	2	2	7.84	-1.13	-1.13	25.81	Primary	dokončana osnovna šola
SI-R3-02	1.0	363	201	2	2	7.94	-1.25	-1.13	25.81	Primary or first stage of basic	dokončana osnovna šola
SI-R4-01	1.0	325	189	2	2	8.12	-1.28	-1.13	25.81	Dokoncana osnovna šola	dokončana osnovna šola
SI-R1-02	2.0	360	291	3	3	10.97	-0.44	-0.50	37.63	Lower secondary	2-3 letna poklicna šola
SI-R2-02	2.0	347	288	3	3	10.73	-0.47	-0.50	37.63	Lower secondary	2-3 letna poklicna šola
SI-R3-03	2.0	339	298	3	3	10.84	-0.61	-0.50	37.63	Lower secondary or second stage of basic	2-3 letna poklicna šola
SI-R4-02	2.0	270	233	3	3	10.66	-0.63	-0.50	37.63	2-3 letna poklicna šola	2-3 letna poklicna šola
SI-R1-03	3.0	471	328	3	4	12.56	0.44	0.42	57.36	Upper secondary	splošna gimnazija, poklicna gimnazija, štiriletna strokovna šola
SI-R2-03	3.0	434	303	3	4	12.36	0.44	0.42	57.36	Upper secondary	splošna gimnazija, poklicna gimnazija, štiriletna strokovna šola
SI-R3-04	3.0	432	302	3	4	12.37	0.40	0.42	57.36	Upper secondary	splošna gimnazija, poklicna gimnazija, štiriletna strokovna šola
SI-R4-03	3.0	382	265	3	4	12.14	0.37	0.42	57.36	Splošna gimnazija, poklicna gimnazija, štiriletna strokovna ?ola	splošna gimnazija, poklicna gimnazija, štiriletna strokovna šola
SI-R1-04	4.0	83	79	5	5	14.37	1.14	0.88	66.75	Post secondary, non-tert	2-letna višja (strokovna) šola

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
SI-R2-04	4.0	72	64	5	5	14.34	1.01	0.88	66.75	Post secondary, non-tert	2-letna višja (strokovna) šola
SI-R3-05	4.0	88	79	5	5	14.57	0.72	0.88	66.75	Post secondary, non-tertiary	2-letna višja (strokovna) šola
SI-R4-04	4.0	86	79	5	5	14.33	0.69	0.88	66.75	2-letna višja [strokovna] šola	2-letna višja (strokovna) šola
SI-R1-05	5.0	129	119	5	6	16.97	1.83	1.65	79.73	Tertiary	visoka šola ali fakulteta
SI-R2-05	5.0	138	115	5	6	16.81	1.86	1.65	79.73	Tertiary	visoka šola ali fakulteta
SI-R3-06	5.0	186	173	5	6	16.83	1.56	1.65	79.73	First stage of tertiary	visoka šola ali fakulteta
SI-R4-05	5.0	166	149	5	6	16.58	1.56	1.65	79.73	Visoka šola, fakulteta, akademija	visoka šola ali fakulteta
SI-R1-06	6.0	11	10	5	7	20.40	2.47	2.41	88.39	Tertiary second stage	magisterij, doktorat
SI-R2-06	6.0	11	11	5	7	18.27	2.93	2.41	88.39	Tertiary second stage	magisterij, doktorat
SI-R3-07	6.0	18	16	5	7	20.87	2.57	2.41	88.39	Second stage of tertiary	magisterij, doktorat
SI-R4-06	6.0	16	16	5	7	19.47	2.03	2.41	88.39	Magisterij, doktorat	magisterij, doktorat
SLOVAKIA											
SK-R2-02	1.0	17	11	1	1	4.60	-2.99	-2.66	14.51	Uncompleted primary	Neukončená základná škola
SK-R3-02	1.0	42	19	1	1	6.06	-2.44	-2.66	14.51	Uncompleted primary	Neukončená základná škola
SK-R4-01	1.1	10	7	1	1	7.57	-2.12	-2.13	18.53	Not completed 1st stage of the basic school	Neukončený prvý stupeň základnej školy
SK-R4-02	1.2	10	4	1	1	9.50	-2.11	-2.11	18.73	Not completed 2nd stage of the basic school	Neukončený druhý stupeň základnej školy
SK-R2-03	2.0	289	134	2	2	8.60	-1.46	-1.42	27.84	Primary	Základná škola
SK-R3-03	2.0	322	148	2	2	8.79	-1.27	-1.42	27.84	Primary	Základná škola
SK-R4-03	2.0	284	184	2	2	8.85	-1.51	-1.42	27.84	Second stage of the basic education	Základná škola

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
SK-R2-04	3.0	420	343	3	3	11.41	-0.57	-0.61	41.35	Secondary, no upper diploma	Stredná škola bez maturity
SK-R3-04	3.0	495	437	3	3	11.65	-0.54	-0.61	41.35	Secondary, no upper diploma	Stredná škola bez maturity
SK-R4-04	3.0	524	469	3	3	11.73	-0.71	-0.61	41.35	Specialized secondary school- without maturita	Stredná škola bez maturity
SK-R2-05	4.0	532	389	3	4	12.41	0.38	0.30	58.27	Secondary, upper diploma	Stredná škola s maturitou
SK-R3-05	4.0	594	444	3	4	13.16	0.25	0.30	58.27	Secondary, upper diploma	Stredná škola s maturitou
SK-R4-05	4.0	674	562	3	4	13.00	0.29	0.30	58.27	Upper secondary education- with maturita	Stredná škola s maturitou
SK-R2-06	5.0	39	35	3	4	14.18	0.88	0.75	66.17	Higher	Nadstavbové štúdium
SK-R3-06	5.0	53	46	3	4	14.39	0.58	0.75	66.17	Higher	Nadstavbové štúdium
SK-R4-06	5.0	56	50	3	4	14.61	0.82	0.75	66.17	Post secondary, non-tertiary education	Nadstavbové štúdium
SK-R2-07	6.0	28	19	5	6	14.94	1.69	1.64	79.15	Tertiary, Bc	Vysoká škola – bakalárske štúdium
SK-R3-07	6.0	53	41	5	6	16.85	1.82	1.64	79.15	Tertiary, Bc.	Vysoká škola – bakalárske štúdium
SK-R4-07	6.0	33	22	5	6	14.73	1.28	1.64	79.15	First stage of tertiary education	Vysoká škola – bakalárske štúdium
SK-R2-08	7.0	120	102	5	7	17.01	1.91	1.90	82.11	Tertiary, M A	Vysoká škola – magisterské štúdium
SK-R3-08	7.0	136	126	5	7	16.87	1.77	1.90	82.11	Tertiary, M.A.	Vysoká škola – magisterské štúdium
SK-R4-08	7.0	177	168	5	7	17.49	1.97	1.90	82.11	Second stage of tertiary education	Vysoká škola – magisterské/inžinierske štúdium
SK-R2-09	8.0	12	9	5	7	18.33	2.42	2.45	87.36	Post-graduate	Postgraduálne štúdium – vedecká výchova
SK-R3-09	8.0	16	14	5	7	18.50	2.32	2.45	87.36	Post-graduate	Postgraduálne štúdium – vedecká výchova
SK-R4-09	8.0	31	26	5	7	19.19	2.52	2.45	87.36	Third stage of tertiary education- PhD study	Vysoká škola - doktorandské štúdium

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
TURKEY											
TR-R2-00	0.0	380	303	1		0.77	-0.87	-0.91	7.83	No education-illiterate	*ISCED-label*
TR-R4-01	0.1	254	197	1		0.06	-1.07	-1.12	6.83	Okuma-yazma bilmiyor	Okuma-yazma bilmiyor
TR-R4-02	0.2	141	106	1		1.48	-0.92	-0.96	8.05	Okuma-yazma biliyor ama okul bitirmemis/diplomasiz	Okuma-yazma biliyor ama okul bitirmemiş/diplomasız
TR-R2-01	1.0	761	659	1		5.07	-0.36	-0.41	13.71	Primary	*ISCED-label*
TR-R4-03	1.0	945	859	1		5.00	-0.43	-0.41	13.71	Ilkokul mezunu (5 yil)	İlkokul mezunu (5 yıl)
TR-R2-02	2.0	271	108	2		8.15	0.25	0.07	21.09	Lower secondary	*ISCED-label*
TR-R4-04	2.0	176	94	2		7.17	-0.21	0.07	21.09	Ilkogretim mezunu (8 yil)	İlköğretim mezunu (8 yıl)
TR-R2-03	3.0	317	192	3		11.26	0.99	1.08	37.00	Upper secondary	*ISCED-label*
TR-R4-06	3.1	26	16	2		8.56	0.54	0.59	32.20	Mesleki ortaokul mezunu	Mesleki ortaokul mezunu
TR-R4-05	3.2	207	113	2		8.04	0.28	0.32	26.12	Genel ortaokul mezunu	Genel ortaokul mezunu
TR-R2-05	4.0	122	101	5		14.96	2.38	2.57	63.19	Tertiary	*ISCED-label*
TR-R4-08	4.1	100	67	3		11.16	0.83	0.91	40.02	Mesleki lise mezunu	Mesleki lise mezunu
TR-R4-07	4.2	370	212	3		11.17	0.94	1.03	43.31	Genel lise mezunu	Genel lise mezunu
TR-R4-09	4.3	185	150	5		14.70	2.48	2.67	82.07	Universite veya yuksekokul mezunu	Universite veya yüksekokul mezunu
TR-R2-06	5.0	4	3	5		19.00	4.49	4.09	95.52	Tertiary second stage	*ISCED-label*
TR-R4-10	5.0	3	1	5		18.00	1.73	4.09	95.52	Master derecesi sahibi	Master derecesi sahibi
UKRAINE											
UA-R2-00	0.0	62	20	1		2.89	-1.84	-1.90	18.46	Not completed primary education [less than 4 years of second	Неповна початкова освіта (менше 4-х класів середньої школи)

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
UA-R3-00	0.0	60	18	1		3.65	-1.84	-1.90	18.46	Not completed primary education (less than 4 years of secondary school)	Неповна початкова освіта (менше 4-х класів середньої школи)
UA-R4-00	0.0	34	11	1	1	2.73	-2.18	-1.90	18.46	Not completed primary (compulsory) education (less than 4 years of secondary school)	Неповна початкова освіта (менше 4-х класів середньої школи)
UA-R2-01	1.0	206	111	1		6.64	-1.69	-1.78	19.95	Primary education [4-7 years of secondary school]	Початкова освіта (4-7 класів середньої школи)
UA-R3-01	1.0	158	90	1		6.51	-1.93	-1.78	19.95	Primary education (4-7 years of secondary school)	Початкова освіта (4-7 класів середньої школи)
UA-R4-01	1.0	108	43	1	1	6.41	-1.74	-1.78	19.95	Primary education (4-7 years of secondary school)	Початкова освіта (4-7 класів середньої школи)
UA-R2-02	2.0	156	90	2		8.65	-1.18	-1.25	27.59	Not completed secondary education [8 -9 years of secondary s	Неповна середня освіта (8-9 класів середньої школи)
UA-R3-02	2.0	141	82	2		9.10	-1.31	-1.25	27.59	Not completed secondary education (8 -9 years of secondary school)	Неповна середня освіта (8-9 класів середньої школи)
UA-R4-02	2.0	136	75	2	2	8.56	-1.30	-1.25	27.59	Uncompleted secondary education (certificate of 8-9 years of secondary school)	Неповна середня освіта (атестат за 8-9 класів середньої школи
UA-R2-03	3.0	504	393	3		10.51	-0.65	-0.72	36.90	Completed secondary education [10-11 years of secondary school)	Повна середня освіта (10-11 класів середньої школи)
UA-R3-03	3.0	502	403	3		10.64	-0.74	-0.72	36.90	Completed secondary education (10-11 years of secondary school)	Повна середня освіта (10-11 класів середньої школи)
UA-R4-04	3.0	331	257	3	4	10.39	-0.81	-0.72	36.90	Completed secondary education (certificate of 10-11 years of secondary school)	ПТУ на базі неповної середньої освіти
UA-R2-04	4.0	664	582	5		12.61	0.08	0.07	50.29	Secondary technical education [college, more than secondary, but not high)	Повна середня освіта (атестат за 10-11 класів середньої школи)
UA-R3-04	4.0	663	565	5		12.14	0.05	0.07	50.29	Secondary technical education (college, more than secondary, but not high)	Середня спеціальна освіта (технікум, вище за середню, але не вища)
UA-R4-05	4.1	211	185	4	3	11.55	-0.50	-0.50	41.08	Professional-Technical School on the base of completed secondary education	Середня спеціальна освіта (технікум, вище за середню, але не вища)
UA-R4-06	4.2	85	80	4	5	11.45	-0.47	-0.46	41.74	Additional education on the base of completed secondary education (professional courses, comprehensive courses etc.)	ПТУ на базі повної середньої освіти

TYPE	EDLVXX	NORI	NNN	ISCED	EISCED	EDUYRS	OPTI	OPTIX	ISLED	DATA LABEL	SHOWCARD LABELS
UA-R4-03	4.3	72	55	2	2	10.85	-1.06	-1.05	30.89	Professional-Technical School on the base of uncompleted secondary education	Додаткове навчання на базі повної середньої освіти (професійні, загальноосвітні курси тощо)
UA-R4-07	4.4	431	365	5	5	12.75	0.13	0.13	53.58	Uncompleted high education (diploma of college)	Перша ступінь вищої освіти (бакалавр)
UA-R2-05	5.0	93	47	5		15.50	1.20	1.18	72.87	First stage of high education [bachelor]	Перша ступінь вищої освіти (бакалавр)
UA-R3-05	5.0	91	48	5		14.17	1.21	1.18	72.87	First stage of high education (bachelor)	Неповна вища освіта (молодший спеціаліст – диплом технікуму, училища, коледжу)
UA-R4-08	5.0	78	53	5	6	13.92	1.17	1.18	72.87	Basic high education (bachelor degree)	Базова вища освіта (бакалавр)
UA-R2-06	7.0	339	301	5		15.84	1.63	1.59	78.40	Completed high education [specialist, master, post-graduate,	Повна вища освіта (спеціаліст, магістр, аспірантура, вчений ступінь)
UA-R3-06	7.0	385	330	5		15.18	1.59	1.59	78.40	Completed high education (specialist, master, post-graduate, scientific degree)	Повна вища освіта (спеціаліст, магістр, аспірантура, вчений ступінь)
UA-R4-09	7.1	347	316	5	7	15.38	1.49	1.48	77.36	Completed high education (specialist degree, master degree)	Повна вища освіта (спеціаліст, магістр)
UA-R4-10	7.2	7	6	5	7	18.83	1.21	1.59	78.91	Postgraduate studies, scientific degree	Аспірантура, вчена ступінь

TYPE: ISO country abbreviation + ESS Round + category code
EDULVXX: Harmonized code.
NORI: Original number of cases
NNN: Effective number of cases
ISCED: ISCED-97 level
EISCED: ESS-harmonization
EDUYRS: Average duration in years
OPTI: Optimal scale score per round
OPTIX: Optimal scale score averaged
ISLED: International Standard Level of Education = OPTIX calibrated by duration
DATA LABEL: English language label in ESS
SHOWCARD LABELS: Labels used in data collection

References

References

Allison, P.D. & Hauser, R.M. (1991). Reducing Bias in Estimates of Linear Models by Remeasuring a Random Subsample. *Social Methods & Research,* 19, 466-492.

Allmendinger, J. (1989). Educational Systems and Labor Market Outcomes. *European Sociological Review,* 5(3), 231-250.

Andrews, F.M. (1984). Construct Validity and Error Components of Survey Measures: A Structural Modeling Approach. *The Public Opinion Quarterly*, 48(2), 409-442

Arrow, K.J. (1973). Higher Education as a Filter. *Journal of Public Economics*, 2, 193-216.

Becker, G. S. (1964). *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education.* New York, National Bureau of Economic Research.

Bentler, P. M. (1980). Multivariate Analysis with Latent Variables: Causal Modeling. *Annual Review of Psychology*, 31, 419-56.

Bills, D. B. (2003). Credentials, Signals, and Screens: Explaining the Relationship Between Schooling and Job Assignment. *Review of Educational Research*, 73(4), 441-469.

Blau, P. & Duncan, O.D. (1967). *The American Occupational Structure*. New York: Wiley.

Bollen, K.A. (1989). *Structural Equations with Latent Variables*. New York: Wiley.

Bourdieu, P. & Passeron, J.-C. (1977). *Reproduction in Education, Society and Culture.* London: Sage.

Breen, R. & Jonsson, J.O. (2005). Inequality of Opportunity in Comparative Perspective: Recent Research on Educational Attainment and Social Mobility. *Annual Review of Sociology*, 31, 223-243.

Brint, S. (1984). "New-Class" and Cumulative Trend Explanations of the Liberal Political Attitudes of Professionals. *American Journal of Sociology*, 90(1), 30-71.

Braun, M. & Müller, W. (1997). Measurement of Education in Comparative Research. *Comparative Social Research*, 16, 163-201.

Brown, D. K. (1995). *Degrees of Control: A Sociology of Educational Expansion and Occupational Credentialism.* New York and London: Teachers College Press.

Campbell, D.T. & Fiske, D.W. (1959). Convergent and Discriminant Validation by the Multitrait-Multi-Method Matrix. *Psychological Bulletin,* 56(2), 81-105.

Davis, J. (1982). Achievement Variables and Class Cultures: Family, Schooling, Job and Forty-Nine Dependent Variables in the Cumulative GSS. *American Sociological Review*, 47(5), 569-586.

De Graaf, P.M. & Ganzeboom, H.B.G. (1993). Family Background and Educational Attainment in the Netherlands for the 1891-1960 Birth Cohorts. Pp. 75-100 in: *Persistent Inequality: Changing Educational Attainment in Thirteen Countries*, Tienda, M. & Grusky, D.B. (eds.), Westview Press.

De Vries, J. & De Graaf, P.M. (2008). The Reliability of Family Background Effects on Status Attainment: Multiple Informant Models. *Quality & Quantity,* 42: 203-234.

DiMaggio, P. & Mohr, J. (1985). Cultural Capital, Educational Attainment, and Marital Selection. *American Journal of Sociology*, 90(6), 1231-1261.

DiPrete, T.A. & Grusky, D.B. (1990). Structure and Trend in the Process of Stratification for American Men and Women. *American Journal of Sociology*, 96(1), 107-143.

Duncan, B. & Duncan, O.D. (1969). Family Stability and Occupational Success. *Social Problems*, 16(3), 273-285.

Enders, C. K. & Bandalos, D.L. (2001). The Relative Performance of Full Information Maximum Likelihood Estimation for Missing Data in Structural Equation Models. *Structural Equation Modeling*, 8, 430–457.

ESS (2013). ESS Round 5 Survey Documentation, Appendix A1. http://ess.nsd.uib.no > ESS5DataDocReport_3.0.pdf

ESS-R1 [European Social Survey Round 1 Data 2002]. Data file edition 6.3. Norwegian Social Science Data Services [distributor].

ESS-R2 [European Social Survey Round 2 Data 2004]. Data file edition 3.3. Norwegian Social Science Data Services [distributor].

ESS-R3 [European Social Survey Round 3 Data 2006]. Data file edition 3.4. Norwegian Social Science Data Services [distributor].

ESS-R4 [European Social Survey Round 4 Data 2008]. Data file edition 4.1. Norwegian Social Science Data Services [distributor].

ESS-R5 [European Social Survey Round 5 Data 2010]. Data file edition 3.0. Norwegian Social Science Data Services [distributor].

European Social Survey (2011). *R5 Survey documentation, Appendix A1: Education, ESS5 - 2010 ed*. ESS5DataDocReportAppendix_A1_3.0.pdf on http://ess.nsd.uib.no/ess/R5/.

Ganzeboom, H.B.G., de Graaf, P.M. & Treiman, D.J. (1992). A Standard International Socio-Economic Index of Occupational Status. *Social Science Research*, 21, 1-56.

Ganzeboom, H.B.G. & Treiman, D.J. (1996). Internationally Comparable Measures of Occupational Status for the 1988 International Standard Classification of Occupations. *Social Science Research*, 25, 201-239.

Ganzeboom, H.B.G. (2009). Improving the Measurement of Social Background Variables in ESS. Project proposal awarded by Netherland Organisation for Scientific Research, 471-09-005.

Ganzeboom, H.B.G. & Treiman, D.J. (2012). International Stratification and Mobility File. http://www.harryganzeboom.nl/ismf. [last revised March 28 2012]

Grusky, D.B. & Van Rompaey, S.E. (1992). The Vertical Scaling of Occupations: Some Cautionary Comments and Reflections. *American Journal of Sociology*, 97(6): 1712-1728.

Hauser, R.M. & Warren, J.R. (1997). Socioeconomic Index of Occupational Status: A Review, Update and Critique. *Sociological Methodology*, 27, 177-298.

Hirsch, F. (1976). *Social Limits to Growth*. London: Routledge & Kegan Paul.

Hoffmeyer-Zlotnik, J.H.P. & Warner, U. (2007). How to Survey Education for Cross-National Comparisons: The Hoffmeyer-Zlotnik/Warner-Matrix of Education. *Metodološki Zvezki*, 4, 117-148.

Hoffmeyer-Zlotnik, J.H.P. & Wolff, C. (eds.) (2003). *Advances in Cross-National Comparison: A European Working Book for Demographic and Socio-Economic Variables.* New York: London Kluwer Academic / Plenum.

Hout, M. & DiPrete, T.A. (2006). What we Have Learned: RC28 s Contributions to Knowledge about Social Stratification. *Research in Social Stratification and Mobility*, 24, 1-20.

Hyman, H.H. & Wright, C.R. (1979). *Education's Lasting Influence on Values*. Chicago: University of Chicago Press.

Hyman, H.H., Wright, C.R., & Reed, J.S. (1975). *The Enduring Effects of Education.* Chicago and London: The University of Chicago Press.

Inglehart, R. (1971). The Silent Revolution in Europe: Intergenerational Change in Post-Industrial Societies. *American Political Science Review,* 65(4), 991-1017.

ISLED (2012). International Standard Level of Education: Documentation, syntax and data file to match with ESS R1-R5. http://www.harryganzeboom.nl/isled.

ISSP-NL (2003-2008). (A) Ganzeboom, H.B.G. & Schröder, H. *ISSP 2007 + 2008: Vrije Tijd. Levensovertuigingen.* The Hague: DANS [distributor] P1813. (B)

Ganzeboom, H.B.G. & Opdam, S. *ISSP 2005 + 2006: Opvattingen over werk. Rol van de Overheid.* The Hague: DANS [distributor], P1812. (C) Ganzeboom, H.B.G. & de Groot, E. *ISSP 2003+2004: Burgerschap en Nationale Identiteit.* The Hague: DANS [distributor], P1811.

ISSP Research Group (2012). *International Social Survey Programme: Social Inequality IV - ISSP 2009.* Cologne: GESIS Data Archive [distributor], ZA5400 Data file Version 3.0.0.

Jöreskog, K. G. & Sörbom, D. (1996). *LISREL 8 User's Reference Guide*. SSII: Lincolnwood IL.

Kalmijn, M. (1994). Assortative Mating by Cultural and Economic Occupational Status. *American Journal of Sociology*, 100, 422-452.

Kelley, J. (1973). Causal Chain Models for the Socioeconomic Career. *American Sociological Review*, 38, 481-493.

Kerckhoff, A.C. & Dylan, M. (1999). Problems with International Measures of Education. *The Journal of Socio-Economics*, 28, 759-775.

Kerckhoff, A.C., Ezell, E.D. & Brown, J.S. (2002). Toward an Improved Measure of Educational Attainment in Social Stratification Research. *Social Science Research*, 31, 99-123.

Korupp, S. (2002). *Mothers and the Process of Social Stratification*. PhD dissertation, Utrecht University.

Lleras-Muney, A. (2005). The Relationship Between Education and Adult Mortality in the United States. *Review of Economic Studies*, 72(1), 189-221.

Lochner, L. (2004). Education, Work, and Crime: A Human Capital Approach. *International Economic Review,* 45(3), 811-843.

Macionis, J.J. & Plummer, K. (2005). *Sociology : A Global Introduction* (3rd ed.). Harlow: Pearson Prentice Hall.

Mare, R.D. (1981). Change and Stability in Educational Stratification. *American Sociological Review,* 46, 72-87.

Mare, R.D. (1991). Five Decades of Educational Assortative Mating. *American Sociological Review* 56(1), 15-32.

Meyer, J.W. (1977). The Effects of Education as an Institution. *American Journal of Sociology*, 83(1), 55-77.

Müller, W. (2008). Foreword. In Schneider, S. L. (Ed.), *The International Standard Classification of Education* (ISCED-97). Mannheimer Zentrum für Europäische Sozialforschung.

Müller, W. et al. (1988). *A comparative analysis of the development and structure of education systems methodological foundations and construction of a comparable educational scale*. University Mannheim: Working Paper.

OECD (1999). Classifying Educational Programmes: Manual for ISCED-97-Implementation in OECD-Countries. http://www.oecd.org/edu/1841854.pdf.

OECD (2011). Education at a Glance: OECD indicators. http://www.oecd.org/education/school/educationataglance2011oecdindicators.htm

Ross, C.E.R. & Wu, C.-L. (1996). Education, Age and the Cumulative Advantage in Health. *Journal of Health and Social Behavior* 37(1), 104-120.

Rutter, M., Tizard, J. & Whitmore, K.E. (1981). *Education, Health and Behaviour*. Huntington, N.Y.: Longman.

Saris, W.E. & Andrews, F.M. (1991). Evaluation of measurement instruments using a structural modelling approach. Pp. 575-599 in Biemer, P.P. et al. (Eds.), *Measurement Errors in Surveys*. New York: Wiley.

Saris, W.E. & Gallhofer, I.N. (2007). *Design, Evaluation, and Analysis of Questionnaires for Survey Research*. Hoboken NJ: Wiley.

Schneider, S.L. (2009). Confusing Credentials: The Cross-Nationally Comparable Measurement of Educational Attainment. DPhil thesis, University of Oxford, Nuffield College. http://ora.ouls.ox.ac.uk/objects/uuid:15c39d54-f896-425b-aaa8-93ba5bf03529.

Schneider, S.L. (2010). Nominal comparability is not enough: (In-)Equivalence of construct validity of cross-national measures of educational attainment in the European Social Survey. *Research in Social Stratification and Mobility,* 28, 343–357.

Schneider, S.L. (2013). The International Standard Classification of Education 2011. *Comparative Social Research*, 30, 365-379.

Schneider, S.L. & Kogan, I. (2008). The International Standard Classification of Education (ISCED-97): Challenges in the Application to National Data and the Implementation in Cross-national Surveys. Pp. 13-46 in: Schneider, S.L (ed.) *The International Standard Classification of Education (ISCED–97). An Evaluation of Content and Criterion Validity for 15 European Countries.* Mannheim: MZES.

Schröder, H. & Ganzeboom, H.B.G. (2012a). De Waarde van Diploma's in Nederland. De ESS-NL Kwantificaties Getoetst. Pp. 63-78 in: K. Aarts & M. Wittenberg (eds.) *Nederland in de jaren nul. Proceedings Derde Nederlandse Workshop European Social Survey.* Amsterdam: Pallas Publications.

Schröder, H. & Ganzeboom, H.B.G. (2012b). Lessons from ESS education measures: exploring the potential of ISCED-2011 to develop a new international standard indicator of level of education, *unpublished manuscript.*

Schröder, H. & Ganzeboom, H.B.G. (2012c). The Comparative Measurement of Level of Education in the ISSP – an Assessment and Application of the ISLED Scale, *unpublished manuscript*.

Schröder, H. & Ganzeboom, H.B.G. (2014). Measuring and Modelling Education Levels in European Societies. *European Sociological Review* 30(1), 119-136.

Shavit Y. & Müller W. (Eds.) (1998). *From School to Work. A Comparative Study of Educational Qualifications and Occupational Destinations.* Oxford: Clarendon Press.

Smits, J., Ultee, W. & Lammers, J. (1998). Educational Homogamy in 65 Countries: An Explanation of Differences in Openness Using Country-Level Explanatory Variables. *American Sociological Review*, 63, 264-285.

Smith, H.L. & Garnier, M.A. (1987). Scaling via Models for the Analysis of Association: Social Background and Educational Careers in France. *Sociological Methodology*, 17, 205-245.

Spence, M. (1973). Job Market Signaling. *The Quarterly Journal of Economics*, 87(3), 355-374.

Stiglitz, J.E. (1975). The Theory of "Screening", Education and the Distribution of Income. *American Economic Review,* 65(3), 283-300.

Thurow, L.C. (1975). *Generating Inequality*. London: The Macmillan Press ltd.

Treiman, D.J. & Terrell, K. (1975). The Process of Status Attainment in the United States and Great Britain. *American Journal of Sociology*, 81, 563-583.

Ultee, W.C. (1980). Is Education a Positional Good? An Empirical Examination of Alternative Hypotheses on the Connection between Education and Occupational Level. *Netherlands Journal of Sociology*, 16, 135–53.

Ultee, W. & Luijkx, R. (1990). Educational Heterogamy and Father-to-Son Occupational Mobility in 23 Nations: General Societal Openness or Compensatory Strategies of Reproduction? *European Sociological Review* 6(2), 125-149.

UNESCO (1997[2006]). ISCED 1997: International Standard Classification of Education. 2006 Re-edition, http://www.uis.unesco.org/TEMPLATE/pdf/isced/ISCED_A.pdf.

UNSD Classifications Newsletter (2011). http://www.uis.unesco.org/Education/Documents/UNSD_newsletter_27e_ISCED.pdf.

Samenvatting

Samenvatting in het Nederlands

In deze dissertatie worden twee methoden onderzocht om de meting van opleidingsniveaus in vergelijkend survey-onderzoek (zowel historisch als internationaal vergelijkend) te verbeteren. De eerste methode bestaat uit het optimaal schalen van onderwijskwalificaties naar een veronderstelde latente hiërarchie. De tweede methode is het combineren van twee afzonderlijke metingen van opleidingsniveaus in een latent variabelenmodel met multipele indicatoren. De beide methoden kunnen afzonderlijk of in combinatie met elkaar worden toegepast en beide leveren een merkbare verbetering van meetkwaliteit op.

De achtergrond van de studie wordt gevormd door de veelheid van verschillende metingen van opleidingsniveaus die in survey-onderzoek wordt aangetroffen. Deze variëteit komt deels voort uit de verschillen in systematiek die onderwijsstelsels als doorgaans nationaal gegroeide instituties nu eenmaal eigen is. De variëteit wordt vergroot doordat onderwijsstelsels zich historisch transformeren door voortdurende hervormingen. In een survey onderzoekt men personen van verschillende cohorten en deze zijn opgeleid in geheel verschillende onderwijsregimes, waarbij het niet mogelijk is aan alle detail recht te doen. Vragen naar onderwijskwalificaties in vragenlijsten bevatten daarom altijd een bepaalde mate van vergroving en vertekening. Maar ook de gebrekkige standaardisatie van het survey-onderzoek draagt bij aan de complexiteit van de uiteindelijke metingen: ook in surveys gehouden in een land in eenzelfde periode treft men vaak een veelheid van – verwante – indelingen aan.

Het verwerken van deze complexe informatie in vergelijkende analyses is niet gemakkelijk. Juist omdat onderwijsstelsels doorgaans binnen een nationale context gegroeid zijn, is een diepgaand begrip van stelsels waarin men niet zelf is opgeleid vaak zeer moeilijk te verkrijgen, in het bijzonder als het gaat om grootschalig landenvergelijkend onderzoek. In het bestaande onderzoek worden twee methoden gebruikt om de veelheid van informatie vergelijkbaar te maken: grootste gemene deler harmonisatie en duurmeting. De grootste gemene deler methode houdt in dat de beschikbare informatie wordt gecondenseerd tot een eenvoudige categorisering, waarin alleen maar grove onderscheidingen worden gemaakt. Daarbij wordt vaak gebruik gemaakt van de International Standard Classification of Education (ISCED), die in beginsel zeven niveaus onderscheidt. Het belangrijkste probleem van deze methode is dat zij noodzakelijk tot informatieverlies leidt. Dit kan tamelijk drastische vormen aannemen, met name

als ISCED-97 wordt gebruikt. In de praktijk brengt deze classificatie de opleidingen terug tot drie of vier niveaus, waarvan de grootste (hoger secundair onderwijs) soms meer dan de helft van de bevolking omvat. Een bijkomend probleem van de grootste gemene deler strategie is dat de harmonisatieproblemen toenemen naarmate men meer bronnen te harmoniseren heeft. Uiteindelijk komt men terecht op een punt waarin zelfs een zeer eenvoudige twee- of driedeling niet meer consistent te maken is met alle onderliggende gegevens, en dat kan natuurlijk de bedoeling niet zijn van het verzamelen en combineren van veel gegevens.

De tweede veel gevolgde strategie om de vergelijkbaarheidsproblemen uit de weg te gaan is helemaal af te zien van het vragen naar en interpreteren van kwalificaties en in plaats daarvan te vragen naar de duur van de onderwijsloopbaan. Dit vereenvoudigt de dataverzameling aanzienlijk en levert een gedetailleerde meting van het opleidingsniveau op. Inhoudelijk zijn er goede argumenten om zo'n duurmeting te gebruiken. Duurmaten hebben een mooie interpretatie binnen de veelgebruikte human capital theorie: ze staan voor de tijdsinvestering in de onderwijsloopbaan die men weer kan uitdrukken in gemist inkomen. Zo kunnen exacte rendementberekeningen gemaakt worden over de gemaakte investeringen. Toch overwegen in de ogen van veel gebruikers de nadelen van een duurmeting. Duur is slechts een grove indicator van de waarde van een opleiding, het is gemakkelijk voorbeelden te vinden waarin er geen nauwe relatie is: juist personen die het niet zo ver schoppen in het onderwijs doen er vaak langer over. Ook laat eerder empirisch onderzoek overtuigend zien dat duurmaten ondanks de mooie psychometrische eigenschappen, eenvoud en gemakkelijke interpretatie tamelijk slechte metingen van het opleidingsniveau opleveren.

In deze dissertatie worden twee alternatieve methoden voor het vergelijkbaar meten van opleidingsniveau voorgesteld en onderzocht. Ze zijn aan de ene kant verwant met de door anderen gebruikte methoden en maken gebruik van hetzelfde materiaal, maar zijn aan de andere kant daarvan een generalisatie en radicale verbetering. De eerste methode is die van optimale schaling van kwalificaties. Deze methode gaat ervan uit dat onderwijskwalificaties een enkelvoudige hiërarchie vormen van hoog naar laag. De plaats van kwalificaties in deze hiërarchie kan ontdekt worden door te kijken naar de relaties tussen onderwijskwalificaties en criteriumvariabelen. Als een kwalificatie meer waard is, drukt zich dat bv. uit in een meerwaarde in de arbeidsmarkt, in het bijzonder verschillen in inkomen. Dit idee staat in de literatuur bekend als

'effect-proportional scaling'. Je kunt de waarde van kwalificaties echter niet alleen ontlenen aan wat ze opleveren, maar ook aan hoe graag mensen ze willen hebben. Dit kun je weer leren uit de samenhang van onderwijskwalificaties met variabelen die voorafgaan aan het behalen van de kwalificaties, in het bijzonder de statuskenmerken van ouders van studenten. Als bepaalde onderwijskwalificaties veel behaald worden door kinderen van ouders met veel status en hulpbronnen, duidt dit aan dat het om waardevolle kwalificaties gaat. Dit in de literatuur ook wel toegepaste idee kan je 'cause-proportional scaling' noemen.

In de hier toegepaste optimale schalingsmethode zijn er drie vernieuwingen toegepast ten opzichte van de eerdere literatuur: (A) effect-proportional en cause-proportional scaling worden gecombineerd, (B) er wordt niet gewerkt met enkelvoudige achtergronden en uitkomsten, er wordt naar meerdere indicatoren daarvan tegelijk gekeken, (C) de schaling wordt uitgevoerd in een indirect effecten model, waarbij optimaliteit wordt afgelezen aan het minimaliseren van het directe effect van inputs op outputs en het maximaliseren de indirecte effecten van inputs op outputs. De optimale schaling van kwalificaties krijgt daarmee de inhoudelijke interpretatie dat je opleidingsniveau het mechanisme is dat je sociale herkomst (opleidingsniveau en beroepsstatus van vader en moeder) met de uitkomsten in de levensloop (beroepsstatus en opleidingsniveau van de partner) verbindt. Dit gezichtspunt en de gebruikte schalingsmethode zijn ontleend aan de constructie van de Internationale Socio-Economic Index van beroepsstatus, waarbij een soortgelijke redenering op het beroep als de verbinding tussen opleiding en inkomen wordt toegepast.

De optimale schalingsmethode heeft als voordeel dat alle nuance die in gedetailleerde opleidingsmetingen voorhanden is, behouden blijft, en op de best mogelijke plaats wordt gezet. Het doet er niet toe of er veel of weinig onderscheidingen gemaakt zijn en eigenlijk ook niet of men inhoudelijk een diepgaande interpretatie van de betrokken kwalificaties heeft. Het gaat erom wat men met die kwalificatie blijkt te kunnen doen en hoe de competitie tussen ouders met verschillende statusniveaus is afgelopen.

Hoewel de methode onder dit gezichtspunt optimaal is, is zij niet perfect: bij de meting van de kwalificaties gaat nog steeds informatie verloren, door grove vraagstelling, maar ook doordat respondenten fouten maken bij het kiezen van hun kwalificatie. Hoe groot de omvang van de overblijvende meetfout is, kan worden uitgemaakt door meting via multipele indicatoren. Het treft daarbij dat in veel vergelijkend onderzoek ook de tweede manier is toegepast om

meetproblemen op te lossen: via een duurmeting. De meting van opleidingsduur levert een onafhankelijke tweede meting van het opleidingsniveau op. De twee metingen kunnen gecombineerd worden in een latent variabelen (factor-analytisch) model, waarin de meetfouten in elke meting kunnen worden geschat en gecorrigeerd. Op die manier krijg je de rol van opleiding te zien als een latente, perfect gemeten variabele, gecorrigeerd voor meetfouten.

De dissertatiestudie is uiteindelijk opgebouwd uit vier empirische hoofdstukken, waarin optimale schaling en en duurmeting telkens worden gecombineerd. In Hoofdstuk 2 wordt de optimale schalingsmethodologie ontwikkeld en toegepast op de gegevens van Ronde 1-4 van het European Social Survey [ESS]. Deze betrekt zich op bijna 200.000 respondenten (na leeftijdselectie effectief ruim 150.000) in 34 landen, die zijn ingedeeld naar meer dan 1154 opleidingscategorieën. In de ESS zijn de vereiste criteriumvariabelen in ruime mate voorhanden: vaders en moeders opleiding en beroep, het beroep van de respondent en de opleiding van de (evt.) partner. Op basis van een eerder ontwikkeld algoritme zijn deze variabelen ingezet om de optimale schaling van al deze opleidingscategorieën te vinden.

De verkregen optimale schaling heeft in eerste instantie een meeteenheid die gestandaardiseerd is binnen landen. Dat is mooi, maar nog niet bruikbaar genoeg als we opleidingsniveaus tussen landen willen vergelijken. Om dit voor elkaar te krijgen hebben we de meeteenheid geijkt op die van de ook in de ESS aanwezige duurmaat, het aantal jaren onderwijs dat de respondent genoten heeft (met correctie van doubleren en part-time episodes). Op die manier ontstaat de ISLED, de International Standard Level of Education. De uiteindelijke schaling naar ISLED is een getal tussen 0 en 100, waarvan het gemiddelde en de standaarddeviatie proportioneel zijn met die van de opleidingsduur van de bevolking in de betrokken ESS landen, terwijl de relatieve waarden van de kwalificaties binnen landen ontleend zijn aan de rol van opleiding in het intergenerationeel statusverwervingsmodel.

In Hoofstuk 2 wordt de kwaliteit van de ISLED vervolgens onderzocht aan de hand van een multipel indicatoren model, waarin kwalificaties en duur beide als meting van het opleidingsniveau worden beschouwd. Het gebruikte valideringsmodel is verder inhoudelijk hetzelfde als gebruikt bij de constructie van de ISLED. Hoe bepaalt het op verschillende manieren gemeten opleidingsniveau de beroepsstatus van de respondent en het opleidingsniveau van de partner, en in welke mate medieert het de invloed daarop van opleiding en beroep

van beide ouders? De kwaliteit van ISLED wordt niet alleen vergeleken met die van de duurmaat, maar ook met een eenvoudige lineaire schaling van het opleidingsniveau, die de meest gangbare grootste gemene deler strategie in de ESS representeert. In deze vergelijking komt ISLED eenduidig naar voren als de betere enkelvoudige meetstrategie. Toch blijkt ook de ISLED schaling niet perfect. Uit het multipele indicatoren model komt als schatting dat ISLED nog steeds leidt tot 5% verlies in meetkwaliteit. Men kan dit verlies alleen goedmaken door gebruik te maken van multipele metingen.

In Hoofdstuk 3 wordt de ISLED schaling opnieuw uitgevoerd, maar nu voor de gegevens van Ronde 5 van de ESS. In deze ronde zijn namelijk drastische veranderingen doorgevoerd in de meting van de opleidingskwalificaties. De veranderingen zijn viervoudig. Ten eerste zijn de ESS landen ertoe gedwongen hun opleidingen meer gedetailleerd te meten. In alle landen is het aantal categorieën toegenomen, maar in sommige meer dan in andere. In totaal zijn nu in een ESS-ronde in 27 landen meer dan 400 kwalificaties gebruikt, die maar ten dele overeenstemmen met de metingen in de eerste vier rondes. Ten tweede is voor deze nieuwe meetstrategie gebruik gemaakt van de nieuwe versie van de ISCED (ISCED-08), of althans een voorlopige versie daarvan. Anders dan de voorgaande versie laat ISCED-08 codering toe via een driecijferige code. Schaling van de ESS-R5 opleidingskwalificaties levert daarom meteen een optimale schaling op van de gedetailleerde ISCED-08 categorieën, waarbij de vraag opkomt of de landspecifieke schalingen veel extra opleveren. Ten derde heeft ESS-R5 een nieuwe grootste gemene deler classificatie geïntroduceerd, de variabele EISCED. Deze onderscheidt zeven niveaus, die echter niet perfect gematched zijn met de basiscategorieën van de ISCED-08. Ten vierde heeft ESS-R5 de gedetailleerde kwalificatiemetingen ook doorgevoerd voor partner, vader en moeder, waardoor het mogelijk wordt de ISLED schaling op deze meerdere bronnen te betrekken.

De situatie van opleidingsmeting in ESS-R5 is ten opzichte van de vorige ronden sterk verbeterd, maar is er voor de gewone gebruiker niet overzichtelijker op geworden. Bij Hoofdstuk 3 van de dissertatie is daarom uitgebreide documentatie opgenomen die aangeeft hoe de veelheid van opleidingsvariabelen in de ESS zich tot elkaar verhouden.

Wat betreft analyse volgt Hoofdstuk 3 nauwgezet die van Hoofdstuk 2. Het resultaat is een nieuwe ISLED schaling, die vanzelfsprekend sterk overlapt met de schaling in Hoofdstuk 2 voor de ESS-R1-4 gemeten kwalificaties. Ook de resultaten van de valideringsprocedures zijn zeer vergelijkbaar: de kwaliteit van ISLED is

veel hoger dan van de duurmaat en van de in ESS-R1-R4 gebruikte harmonisatie. Ook nu blijkt de ISLED echter geen perfecte meting. Twee resultaten zijn nieuw. Ten eerste blijkt de winst van een optimale schaling van landspecifieke opleidingscategorieën ten opzichte van een optimale schaling van de op ISCED-08 gebaseerde gedetailleerde opleidingscategorieën verwaarloosbaar te zijn. Dat is misschien niet verrassend omdat de landspecifieke categorieën genest zijn in de op ISCED-08 gebaseerde meting. Het is een heel belangrijk resultaat, omdat het de toepassing van de ISLED schaling in toekomstig onderzoek bijzonder vergemakkelijkt. Alle in ISCED-08 gecodeerde opleidingsvariabelen kunnen eenvoudig in de ISLED-schaling vertaald worden. Een tweede nieuw resultaat is dat de nieuwe in ESS-R5 opgenomen harmonisatie EISCED de optimale schaling zeer dicht benadert. Niet zozeer het detail, maar het maken van de juiste onderscheidingen blijkt de doorslag te geven. Deze winst zit er vooral in dat EISCED op alle niveaus een consequent onderscheid maakt tussen algemeen vormend en beroepsgericht onderwijs, hetgeen ISCED-97 noch ISCED-08 doen in hun eerste cijfer. In de Nederlandse verhouding komt dit erop neer dat met name het onderscheid VWO / MBO wordt vastgehouden, terwijl dit in eerder gangbare harmonisaties op een hoop wordt geveegd.

Hoofdstuk 4 bevat een toepassing van de ISLED en het multipele indicatoren model op een nieuwe dataset, namelijk de gegevens die in Nederland sinds 2002 voor het International Social Survey Programme [ISSP] zijn verzameld. De ISSP gegevens zoals verzameld in Nederland, zijn rijker aan stratificatievariabelen dan de ESS. De cruciale toevoeging is dat in de ISSP-NL ook een duurmaat verzameld is voor de opleiding van de partner, naast diens kwalificaties. De beschikbaarheid van een dubbele meting van twee opleidingen opent mogelijkheden via een multiple indicatoren model niet alleen random meetfouten op te sporen, maar ook systematische meetfouten, dit zijn meetfouten die bij elke opleidingvariabelen gemaakt worden. Deze uiten zich als gecorreleerde residuen, die erop neerkomen dat soortgelijke metingen van een onderliggend construct extra hoge correlaties laten zien. Zulke correlaties duiden op meetfouten, die ook gemaakt worden wanneer men maar één opleidingsvariabele met multipele indicatoren probeert te meten, maar dan niet zichtbaar worden.

In de klassieke psychometrie is voor deze situatie de multi-trait multi-method [MTMM] methodologie ontwikkeld, die voornamelijk wordt toegepast om systematische en toevallige meetfouten bij attitudemeting op te sporen. Men kan deze methodologie ook toepassen op meting van sociaal-structurele variabelen, zoals het opleidingsniveau. Bij toepassingen op attitudemetingen

wordt meestal gebruik gemaakt van een design waarin drie 'traits' via drie indicatoren ('methods') worden gemeten: in deze situatie zijn alle effecten afzonderlijk geïdentificeerd. De ISSP-NL data zijn veel beperkter (twee traits met elk twee indicatoren). Het blijkt evenwel dat identificatie van toevallige en systematische meetfouten mogelijk is wanneer we het model verrijken met hulpvariabelen, waarvoor in het bijzonder sociale achtergrond en uitkomsten op arbeids- en huwelijksmarkt bruikbaar zijn.

Toepassing van de MTMM methodologie levert weinig andere inzichten op ten aanzien van het optreden van toevallige meetfouten: de kwalificatiemeting is hiervoor minder gevoelig dan de duurmeting. Nieuw is dat we nu ook een inzicht verkrijgen in het optreden van systematische meetfouten. Deze blijken bij de kwalificatiemeting nagenoeg afwezig te zijn, maar bij de duurmeting wel een significante rol te spelen. Bij de duurmeting maken de respondenten dus niet alleen meer meetfouten, ze maken ook vaak dezelfde fouten. Dit uit zich in een extra hoge correlatie tussen de duurmetingen van respondents en partners opleidingen, die niet is terug te voeren tot de latent gemeten opleidingshomogamie.

Saris en Andrews hebben een SEM model voorgesteld, waarin het klassieke MTMM model wordt omgeformuleerd tot een model dat precies overeenstemt met het meten van de validiteit en betrouwbaarheid van een meetinstrument. Via het Saris-Andrews model verkrijgt men een validiteitscoëfficiënt, die aangeeft in hoeverre de stabiele score samenhangt met een achterliggende latente dimensies, en een betrouwbaarheidscoëfficiënt die aangeeft hoe deze stabiele score samenhangt met de empirische meting. Deze berekeningen zijn ook toegepast op de meting van het opleidingsniveau van respondent en partner via kwalificaties en de duur. De uitslagen laten zien dat invaliditeit en onbetrouwbaarheid nagenoeg gelijke verantwoordelijkheid hebben voor de geringere meetkwaliteit van de duurmaat.

Hoofdstuk 5 bevat ook een validatiestudie van de ISLED op nieuwe data, namelijk die van de ISSP2009, waarin wereldwijd intergenerationele mobiliteitsgegevens zijn verzameld. Deze valideringsstudie beantwoordt de mogelijke kritiek dat de in de twee eerdere hoofdstukken ontwikkelde ISLED schaling niet voldoende beproefd is doordat voor de validering gebruikte gegevens dezelfde zijn als waarmee de optimale schaling is verkregen. Men zou daar terecht tegenin kunnen brengen dat dit het gevaar van kanskapitalisatie met zich meebrengt. Wat optimaal is in een dataset, is dat misschien helemaal niet in een nieuwe dataset.

De ISSP2009 biedt minder mogelijkheden om de procedure op waarde te testen dan de ESS. De stratificatievariabelen beperken zich tot de beroepen van vader, moeder, respondent en partner, terwijl de opleidingen van de ouders en de partner ontbreken. Wel bevat de ISSP gedetailleerde landspecifieke opleidingsmetingen voor de respondent, een eigen harmonisatie (DEGREE) en een onafhankelijke duurmeting van opleiding. De analyses beperken zich tot de Europese gegevens uit de ISSP, omdat de ISLED op Europese gegevens ontwikkeld is. Een aantal landen vallen af doordat men zich niet aan het afgesproken design van de studie heeft gehouden. Uiteindelijk heeft de valideringsstudie betrekking op 25.999 respondenten in 21 landen.

Ondanks de gebrekkige opzet van de ISSP2009 gegevens bevestigen de uitkomsten van de valideringsmodellen nagenoeg perfect die van de eerdere hoofdstukken. ISLED is een belangrijke verbetering ten opzicht van de duurmeting en een kleine, maar merkbare verbetering van de gangbare ISSP harmonisatie DEGREE (die het overigens beter doet dan op ISCED-97 berustende harmonisatie in ESS-R1-R4). Ter vergelijking is ook nog een optimale schaling binnen de ISSP2009 berekend. De meetkwaliteit hiervan is niet bijzonder veel beter dan die van de aan de ESS data ontleende ISLED schaling. Alles tezamen beschouwen we dit als een sterke bevestiging van de kwaliteit van twee hier voorgestelde methoden om de meting van het onderwijsniveau in vergelijkend onderzoek te verbeteren.

Acknowledgements

Many people have, directly or indirectly, contributed to this dissertation and I would like to express my gratitude to all of them. First and foremost I want to thank my main advisor, Harry Ganzeboom, who was not only a major contributor of ideas to the project, but also supported and inspired me throughout with seemingly limitless expertise, kindness, humour and good spirits. Likewise, my thanks go to my second advisor Melinda Mills, who provided some valuable critique and helped me through some of the more difficult moments. Many thanks also to Marjolein Broese van Groenou as well as to the members of the Social Inequality and the Life Course (SILC) and Inter-University Social Inequality and Life Course (ISOL) research seminars for helpful comments on draft versions of various chapters. My special thanks go furthermore to Svea Gustavs for transforming the manuscript into the book at hand and Vincek Sykora for designing the cover.

During the entire process of writing this dissertation I was lucky to be surrounded by exceptionally kind and supportive colleagues. I would like to thank all my colleagues from the Departments of Research Methodology and Sociology at the VU-University, specifically: David Nikoloski and Natasha Tolkacheva, my paranymphs, Anouk van Leeuwen, Arjen de Vetten, Bianca Suanet, Carolina Zuccotti, Dunya van Troost, Igor Petrovic, Ismintha Waldring, Kadri Täht, Maarten Buis, Tamira Sno and Tina Glasner whom I shared office with over the years, the Sociology PhD group, as well as Cees Elzinga, Ietje Breunis, Irma Mooi-Reci, Lorraine Nencel, Peer Smets, Sawitri Saharso and Ulrike Vieten. The supportive working environment was not limited to my own departments and I would like to include my colleagues and friends from other departments and universities into my acknowledgements, especially Daniela Grunow, Deborah Rice, Evelyn Ersanilli, Ewa Szepietowska, Femke Brandt, Georg Datler, Katia Begall, Melanie Eijberts, Nancy Andrew, Natalia Zborowska and Robert Brown.

In my private life too I was lucky to be surrounded by caring people. My thanks go to Conny Boerlage and Sybolt Hakman, as well as to all my friends, in particular Andreas, Aster, Chadiza, Ewa, Leontine, Maya and Zosia. Last but not least I would like to thank my family. My mother would have been proud to see this book published, but unfortunately cannot share this moment with me anymore. The one person without whose support I would never have started this endeavour (let alone finished it...) is my husband Mick. He paved the way towards this project and kept me on track and happy throughout, with his unconditional support, patience and humour. Much to my despair, he is not here to witness the project's completion either. Fortunately, my dear children Emily and Alexander are and my last words of thanks go to them.

Graphic Design/Cover: Vincek Sykora, Berlin
Graphic Design/Layout: Svea Gustavs, Amsterdam
Technical support: David Nikoloski, Amsterdam
Printing and binding: Ridderprint BV, Ridderkerk