

# How to Survey Education for Cross-National Comparisons: The Hoffmeyer-Zlotnik/Warner-Matrix of Education

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## Abstract

Social surveys collect information on socio-demographic characteristics of respondents eligible for the interview. Among others, the highest attained level of education is one of the variables explaining the respondent's social and political compoment, the interviewee's human values and orientations, the transition from school to work, the position in the labor force and its segments, the social and economic behavior of the individual actor and structural inequalities in modern societies. Manifold strategies to operationalize the qualification and education variables during interviews can be observed in social surveys. They differ in the underlying latent concept captured, the ranking and classifying of levels into categories and clusters, the degree of classification and measurement details and finally the capabilities of comparison across time and across nations and cultures.

The measurement of education for comparative research across countries is a complex task. The national systems of education and schooling are differently organized across the nations. Altogether four different types of school and training systems can be identified in Europe. In this paper we will sort the national certificates from general and vocational schools into one matrix, the newly developed Hoffmeyer-Zlotnik/Warner-matrix of education. This matrix allows us to compare the highest level of education a person has reached, as a combination of general and vocational education and useable for a person to obtain a starting position on the labor market. This article discusses those measurement instruments normally used in international comparative surveys and introduces the Hoffmeyer-Zlotnik/Warner-matrix of education, contrasting this matrix with the other established measurement instruments. To demonstrate the validity of our matrix, we show the advantages of our matrix exemplified in one case from nations out of the four types of different educational systems: Germany, Luxembourg, Denmark, and France.

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## 1 The problems

Because of their historical development and their political tradition, national education systems are particular for each nation. In general, each school system incorporates in general education the pre-school, the basic school and the continuing education leading to a university entrance diploma. Between basic education and university entrance diploma several school leaving certificates are possible. Basic education can be finalized after eight, nine, or ten grades and university entrance diploma can be reached after 12 or 13 grades. In between there are zero, one or two gradual possibilities to leave a school system in Europe with qualifications valid on the labor market. Beside general education different types of vocational instructions, school or/and enterprise based training and academic schools up to universities, are eligible to complete vocational education. Often it is a mixture of general and vocational education which leads to a higher level of education.

For survey researchers designing questionnaires and measuring education, scientific expertise is necessary to identify all possible combinations of general and vocational education for one country. A comparative approach starts with a schematic outline. Common to all national educational systems are four sections:

- The primary section, including the pre-school (up to 4 years) and basic education for 4 or 6 years of schooling;
- the lower secondary section, which in most European countries covers the general education until the end of basic education with a first school certificate after 8 to 10 years of schooling;
- the upper secondary segment, which includes the school institutions until the entry of high school, and the professional training until the first vocational certificate that allows to execute the learned profession; the upper secondary segment on general education ends with the university entrance diploma;
- the tertiary section, containing all the different types of schools providing further vocational education, the applied universities and the universities with academic education until research qualifications are obtained.

So far, three common anchor points can be identified. First, the basic degree which differs across countries by duration of schooling and the pupil's age sanctioned with a school leaving diploma. Second, the highest possible degree of general education as the entry point to university, in general obtained after 12 or 13 years of schooling. And finally the end of university education with the PhD thesis (not considering the fact that in some countries a higher university diploma

as PhD is possible, like the German “Habilitation”) entering into research professions.

The differences across the national education systems are based on various objectives about the optimal function and the aims of education. The institutionalization of schooling is driven by national ideologies and traditional developments, and education is finally codified in national law.

The definition of “basic education” varies across countries. The meaning of “basic” has an impact on the duration of schooling for a successful basic degree, the description of compulsory full-time school, the differentiation into parallel types of schooling and the split off point into further specialized courses. In Germany, this horizontal differentiation takes place before the end of basic education while in France or in Denmark, this separation comes after having obtained a basic degree. It is obvious that there is an impact on the parent’s decision for further education for their children. Characteristics influenced by the definition of basic education are the national structures of the school institutions: Are there diplomas built one upon each other hierarchically and depending on each other? Do diplomas increase in their validity to enter the labor force and built on upon as sequences of educational careers? Beside this vertical structure are there horizontal differentiations of parallel educational institutions? Is it intended and possible for pupils to switch from one track to a parallel upwards path in the school career? And if so, how difficult is it to change? How permeable are the national types of school?

The national education systems are also structured by

- the (legal) rules on entry and leaves to dedicated school types and levels,
- the duration of minimum and maximum schooling periods,
- the possibilities to repeat classes and examinations, and
- the maximum number of allowed repetitions.

An important factor is the degree of side by side existence of private and public schooling in the general and professional training sectors. Of course, the transition from general to vocational sectors characterizes the national school system. The differentiation of professional education certificates and their following up rules are of importance. An important question concerns the political and social acceptance of schools and their diplomas as well as the legal and political control of the state. All these elements distinguish the European educational systems.

## **2 The four types of national educational systems**

This chapter describes the educational systems of four European countries: Germany, Luxembourg, Denmark, and France. Each of these countries stands for

one of the four different types. All educational systems in Europe can be assigned to one of these four different types. The four types of educational systems differ in main and fundamental points:

The first type, represented by Germany:

- The primary school runs for a short number of years: around 4 years.
- The lower secondary sector is much differentiated with three or more types of different schools.
- The upper secondary sector consists of one type of general school, but is much differentiated into parallel tracks with different types of vocational schools.
- The tertiary sector consists of parallel schools providing further vocational education, applied universities, a greater number of academic high schools and universities.
- The lower secondary, the upper secondary and the tertiary sector are clearly separated from each other.

The second type, illustrated in the case of Luxembourg:

- The primary school runs for a longer number of years: around 6 years.
- The lower secondary sector consists of a limited number of school types and of low horizontal differentiation.
- The upper secondary sector encloses different types of general and vocational schools.
- The tertiary sector contains schools providing academic vocational education and the newly founded university in Luxembourg.
- There is a distinct separation of the tertiary sector from upper secondary education, however, the passages from lower to upper secondary schools are quite simple to manage.

The third type is represented by Denmark:

- The primary school is combined with lower secondary school to a comprehensive school.
- The upper secondary sector has a large repertoire of types of general schools and one type of vocational school.
- The tertiary sector shows small differentiation from schools providing vocational education to universities.
- The primary and both secondary sectors of schooling are integrated, only the tertiary education is separated.

The fourth type is represented by France:

- The pre-primary school with duration of three years is optional, but 99.9% of the three-year-olds attended pre-primary school in 1998/1999 (Eurydice 2003b, p. 12).
- The primary school takes for a longer number of years: around 5 years.
- The lower secondary sector is one type of schooling without differentiation.
- The upper secondary sector consists of low vertical differentiation.
- The tertiary sector is much more differentiated with schools providing vocational education, specialized universities and general universities.
- The primary and lower secondary branches of the educational system are integrated and the upper secondary and tertiary sector are clearly separated.

These descriptions of the national education institutions are in line with the typology of colleagues from the Dutch Social and Cultural Planning Office (SCP 2004: Table 3.1 p 101) for the EU-25 countries. They sort Germany, Belgium, Netherlands, Hungary and the Czech Republic into the first type of education systems. Using the degree of separation between the educational sectors, the selectivity of each sector and uniformity versus heterogeneity of the secondary education as sorting criteria, they class Luxembourg, Austria and Slovakia into the second model of school systems. Together with Denmark they identify Finland, Sweden, Portugal, Estonia, Lithuania, Poland and Slovenia for the third version of educational systems. The fourth family gathers countries like France, Greece, Ireland, Italy, Spain, the United Kingdom, Cyprus, Malta and Australia as school systems with homogeneous vertical sectors, but horizontally the upper secondary and the following tertiary education are clearly separated in parallel tracks.

## **2.1 Education in Germany**

In Germany, compulsory education lasts for 9 school years. From their sixth year of age onwards children attend "Grundschule" for 4 classes. After this primary part, pupils can choose at least between three types of secondary schools: "Hauptschule" for the next 5 school years, "Realschule" that runs for 6 school years, or "Gymnasium" for the next 8 to 9 classes.

Leaving "Hauptschule" with a sanctioned certificate, pupils have finished the lower secondary education; now vocational training in the dual system or in vocational school is possible and becomes the normal school career. After successfully finishing "Realschule" it is possible to continue with "Fachoberschule". "Abitur" is the diploma obtained at the "Gymnasium"; it is the standard entrance diploma to university and finishes upper secondary education. Other types of upper secondary education are various types of vocational schools leading to professional diplomas.

The German tertiary sector is differentiated into a wide range of schools providing vocational and academic qualifications. The range goes from vocational school (Fachschule) to technical college (Fachoberschule), university of applied sciences (Fachhochschule) and to university.



Source: European Commission, 2005.

**Figure 1:** Educational system in Germany.

In Germany, national social surveys ask for finalized general and vocational education using two different questions (Statistisches Bundesamt 2004: 9 – 10):

1<sup>st</sup> The general education (see Table 1) is measured by certificates. There is the basic education degree reached after the 9<sup>th</sup> class, in some particular cases the 10<sup>th</sup> class, which certificates finalized basic education. A second family of certificates is obtained after the 10<sup>th</sup> class in upper secondary schools, in general specializing in applied qualifications. A third group of certificates with either general or more applied orientation is achieved after the 12<sup>th</sup> class, allowing a conditional university entrance for specific subjects or leading to universities of applied sciences. A fourth group of certificates with general orientation is achieved after the 12<sup>th</sup> or 13<sup>th</sup> class and is considered the university entrance diploma. In Germany, education varies over the sixteen federal states. In different federal states, school types and certificates have different names; but all certificates are in equivalence to one of the named four types.

2<sup>nd</sup> The vocational education (see Table 2) also is measured by certificates. Different leaving certificates from the dual system (alternate teaching in full-time schools and in the firms “on the job”) with two grades, different types of vocational full-time schools with in general two grades, and finally the different diploma issued by the universities of applied sciences and from general and technical universities exist.

**Table 1:** Highest level of general education Germany, Demographic Standards 2004.

Categories	
0	von der Schule abgegangen ohne Hauptschulabschluss (Volksschulabschluss)
1	Hauptschulabschluss (Volksschulabschluss)
2	Realschulabschluss (Mittlere Reife)
3	Abschluss der Polytechnischen Oberschule 10. Klasse (vor 1965: 8. Klasse)
4	Fachhochschulreife, Abschluss Fachoberschule
5	Allgemeine oder fachgebundene Hochschulreife / Abitur (Gymnasium bzw. EOS)
6	anderer Abschluss, welcher? .....

Source: Statistisches Bundesamt 2004, p. 9

**Table 2:** Highest level of vocational education, Germany, Demographic Standards 2004.

Categories	
0	Keinen beruflichen Abschluss und nicht in der Ausbildung
1	beruflich-betriebliche Berufsausbildung (Lehre) abgeschlossen
2	beruflich-schulische Ausbildung (Berufsfachschule, Handelsschule) abgeschlossen
3	Ausbildung an einer Fachschule, Meister-, Technikerschule, Berufs- oder Fachakademie abgeschlossen
4	Fachhochschulabschluss
5	Hochschulabschluss
6	anderer Abschluss, welcher? .....

Source: Statistisches Bundesamt 2004, p. 10.

Based on these question outcomes, German social survey research needs a two dimensional matrix to construct the rank order concerning educational attainment or a hierarchical social hierarchy of educational levels. Table 3 shows the categories for Germany filled with the data from the European Social Survey, round 1 (data collection in 2002).

**Table 3:** General education by vocational education, **Germany**, ESS 1st round.

vocational education by degree	general education by degree							total N
	non	8 <sup>th</sup> /9 <sup>th</sup> class	10 <sup>th</sup> class	12 <sup>th</sup> class	Abitu r* <sup>)</sup> 12 <sup>th</sup> /1 3 <sup>th</sup> class	others	column n %	
non	14.3	64.8	11.5	0.8	7.0	1.6	10.1	244
dual system	1.4	49.2	42.2	2.4	4.7	0.2	48.0	1161
vocational school	0.7	31.6	46.3	8.8	11.8	0.7	5.6	136
vocational college	0.0	27.0	49.2	11.8	11.5	0.5	15.8	382
univ. of applied sciences	0.0	3.8	24.6	27.7	41.5	2.3	5.4	130
university	0.3	1.4	2.4	7.4	86.1	2.4	12.2	296
others	1.4	28.2	52.1	5.6	9.9	2.8	2.9	71
row %	2.2	37.4	34.9	6.2	18.5	0.9	100.0	2420

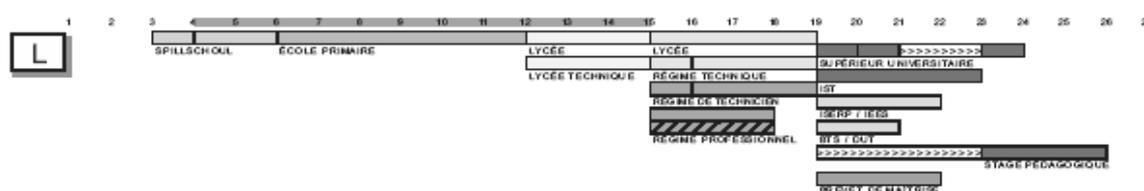
\*) University-entrance diploma

Source: German subset of ESS round 1 provided by the ESS national coordinator in Germany, computation by the authors

## 2.2 Education in Luxembourg

In Luxembourg, the primary school starts at the age of 6 and ends at the age of 11. There is no vertical segmentation during the 6 grades of primary education. A first orientation to further schooling is possible at the pupil's age of 12. The secondary sector is divided into complementary, technical and general schools and lasts until the end of compulsory schooling at normally 14 years. At this age, a second orientation allows pupils to choose between the upward paths leading to professional, technical and general certificates ending the upper secondary sector. The duration of "lycee" varies between 3 and 7 classes.

The upper secondary education is very diverse and the third sector contains several professional educational institutions. Several vocational schools and a university of applied sciences do also exist on the tertiary sector, including for some years now the University of Luxembourg.



Source: European Commission, 2002.

**Figure 2:** Educational system in Luxembourg.

**Table 4:** Highest level of education, **Luxembourg**, ESS 1st round.

Categories	Total	Valid Percent
0 Pas de diplôme/qualifications	20	1.3
1 Ecole primaire	254	16.7
2 Primaire supérieur	120	7.9
3 Enseignement complémentaire	98	6.4
4 Certificat d'enseignement secondaire technique inférieur	52	3.4
5 Certificat d'apprentissage	22	1.4
6 Certificat de Capacité Manuelle	22	1.4
7 Certificat d'Initiation Technique et Professionnelle	36	2.4
8 Certificat d'Aptitude Technique et Professionnelle	237	15.6
9 Diplôme de technicien (jusque 13e dans le régime tech.)	36	2.4
10 Bac technique (jusque 13e ou 14e du régime technique)	50	3.3
11 Enseignement secondaire général inférieur	115	7.6
12 Diplôme de fin d'études secondaires	139	9.1
13 Brevet de maîtrise artisanale	32	2.1
14 Enseignement supérieur - BAC +2	53	3.5
15 Enseignement supérieur - BAC +3	57	3.7
16 Enseignement supérieur - BAC +4	57	3.7
17 Enseignement supérieur - BAC +5 ou plus	57	3.7
18 Enseignement supérieur - Doctorat	11	.7
19 Autre: Précisez	43	2.8
<b>Total</b>	<b>1523</b>	<b>100.0</b>

Source: ESS round 1, computation by the authors.

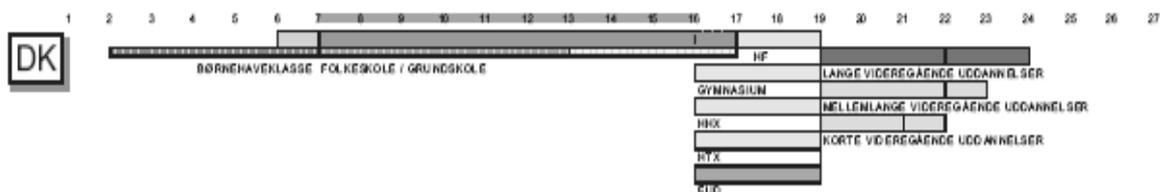
Social survey questionnaires in Luxembourg measure education in one question (see Table 4). The response categories proposed to the respondent group all certificates into possible categories covering all combinations of certificates common in the country.

The listed categories are those 19 different response categories used in the European Social Survey, round 1 (fieldwork in 2002). Here, the question concerns the highest level of education. On first glance, the proposed certificates are much more detailed than in Germany and Denmark and do not summarize the national education system. The labor market in Luxembourg is characterized by a very high proportion of non-Luxembourgish employees and workers who are not educated and trained in the national education system. Therefore, the response categories also cover equivalences of qualifications obtained in the neighboring countries of Luxembourg.

### 2.3 Education in Denmark

In Denmark, compulsory education starts at the age of 6 at "Folkeskole" and lasts 9 years long for all pupils (as comprehensive school covering primary and lower secondary school). Either a voluntary 10<sup>th</sup> year, or the Gymnasium (for 3 years), or vocational education follows.

The general upper secondary education is much more diversified than in Germany, whereas the primary and lower secondary sectors are unified into one track of schooling and the tertiary sector offers three types of high schools.



Source: European Commission, 2002.

**Figure 3:** Educational system in Denmark.

The European Social Survey asks for educational levels in Denmark using ten categories (see Table 5). These ten categories are oriented at the seven levels of the International Standard Classification of Education (ISCED 1997) demanded by the coordinators of the European Social Survey.

**Table 5:** Highest level of education, **Denmark**, ESS 1st round.

Categories	total	Valid Percent
0 Ingen skoleuddannelse, ingen erhvervsuddannelse	2	0.1
1 1.-6. skoleklasse, ingen erhvervsuddannelse	18	1.2
2 7.-10. skoleklasse, ingen erhvervsuddannelse	351	23.5
3 Gymnasium, HF, HH, HTX, ingen erhvervsuddannelse	103	6.9
4 Erhvervsfaglige uddannelser, håndværkeruddannelser, social og sundhedshjælperuddannelser	594	39.8
5 Arbejdslederuddannelser for faglærte	32	2.1
6 Videregående uddannelser på 2-3 år <u>efter</u> gymnasium eller faglig uddannelse	137	9.2
7 Videregående uddannelser på ca. 4 år <u>efter</u> gymnasium eller faglig uddannelse	149	10.0
8 Bachelor eller kandidateksamen fra universitet	98	6,6
9 Overbygning på universitetseksamen, Ph.d., licentiat	10	0.7
Total	1494	100.0

Source: ESS round 1, computation by the authors.

The certificates of the Danish educational system are:

- "Folkeskolens Afgangsprøve" basic education after 9 years
- FS10 or Efterskole, adjusted "Afgangsprøve" after 10 years
- Studentereksamen, university entrance diploma after 3 years college

There are different types of colleges: the general screen (gymnasium and HF, higher preparatory examination), the commercial college (Højere Handelsgymnasium HHX, higher commercial examination), the technical college (HTX, higher technical examination).

As Vocational Education and Training (VET) there are two steps of dual training principles building on each other:

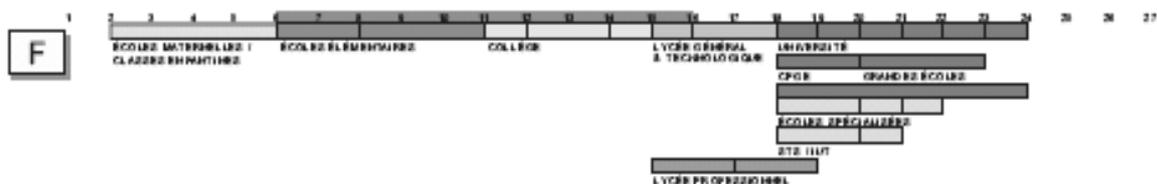
VET basic courses	typically last 20 weeks
VET main courses	typically last 3 to 4 years
the higher education, short cycle	build on to a VET program
the higher education, medium cycle	3 to 4 years
the higher education, long cycle: bachelor	3 years
candidatus	2 years, build on bachelor
PhD	

(Undervisnings Ministeriet, 2000, chapter 2)

## 2.4 Education in France

In France, for nearly 100% of the children schooling starts at the age of about three years with the "école maternelle" (pre-school education). The elementary school starts with six years and ends at the age of 10. The secondary sector begins at the age of 11 and ends after four years of school with national brevets. The second stage of the secondary sector is built from the general and technical high schools (lysée d'enseignement général, lysée d'enseignement technologiques) and the professional high school (lysée d'enseignement professionnels) and takes between three and four years. Mostly, the diploma obtained at the general high school leads to university education, other diplomas of higher professional education to employment. Compulsory education lasts until the pupil reaches the age of 16 years.

The French educational system is characterized by less differentiated institutions leading to the tertiary schools. A differentiation can be seen at the university education and the non-university education with the "grand écoles" (elite schools for civil engineering and public administration) and various professional schools.



Source: European Commission, 2002.

**Figure 4:** Educational system in France.

The French data from the European Social Survey 2002 show that 74% of the surveyed persons have obtained diploma at the end of the upper secondary education (see Table 6).

**Table 6:** Highest level of education, **France**, ESS 1st round.

Categories	total	Valid Percent
1 Sans diplôme	133	8.9
2 Non diplômés du CAP BEP filière professionnelle	57	3.8
3 Certificat d'études primaires	67	4.5
4 Non diplômés jusqu'à la fin 3ème, 2nde, 1ère filière general	191	12.7
5 CAP, examen de fin d'apprentissage artisanal	186	12.4
6 BEP, BP, BEA, BEC, BEI, BES	143	9.5
7 Brevet élémentaire, brevet d'étude du premier cycle, brevet	76	5.1
8 Baccalauréat général, brevet supérieur	165	11.0
9 Brevet de technicien, baccalauréat de technicien, baccalauréat profession.	93	6.2
10 Diplôme universitaire du premier cycle (DEUG), diplôme universitaire de technologie	155	10.3
11 Diplôme universitaire des deuxième et troisième cycles, Doctorat	236	15.7
Total	1502	100.0

Source: ESS round 1, computation by the authors.

### 3 Measurement instruments for cross-national comparison

Today, in comparative research five instruments are used to measure and to compare the different level of education across countries and systems (Braun & Müller, 1997; Hoffmeyer-Zlotnik & Wolf, 2003):

- years of schooling,
- the “CASMIN Educational Classification”,
- the “Hoffmeyer-Zlotnik Educational Classification”, and
- the “International Standard Classification of Education” (ISCED 1997), and finally
- the “sectors of education”.

### 3.1 Years of schooling

In surveys for cross-country comparison, the instrument “years of schooling” is the most widely used measure of education. Two problems can be discovered using this scale.

The first problem is the item that should be measured: time or grades. In an educational system where it is allowed to repeat classes, it is not meaningful to count the time. For counting the time in school, the starting point and end point should be defined very explicit and must be clear to the respondent. “Years of schooling” only is meaningful if grades are counted during the interview and are used by the researcher to compare qualification across countries.

The second problem is the question wording. Each survey uses its own question and focus on the information in slightly different manners. As consequences slightly different facts are measured by the unlike question stimuli. The following four questions are examples:

- The *European Social Survey (ESS)*, round 1, question F7 asks: “How many years of full-time education have you completed?”
- The *International Social Survey Programme (ISSP)* asks about “years (of full time) schooling including university but not vocational training” are completed.
- The *General Social Survey (GSS) of the U.S.* asks about “grades” and “years of college” (NORC and Roper, 1996: 49).
- The German *Sozialwissenschaften-Bus 1996* (Social Science Bus survey) question wording is: “In which age did you leave general school?” (GFM-GETAS/WBA, 1996: 2).
- the *French Census (1968 till 1982)* is asking about age when the respondent completed school (IECM & IPUMS 2006: edu-2-)

All five questions generate different answers. ESS and ISSP obtain the number of years spent in educational institutions, and the ISSP does not include years spent in vocational education. The American GSS (General Social Survey) asks for grades. The German Social Science Bus survey and the French Census ask about the age when the respondent left or completed school; but counting the live time has nothing to do with a higher degree of education because it is unknown in which age the respondent has started school, and it is unknown how many years were repeated.

### 3.2 The CASMIN Educational Classification

The CASMIN Educational Classification “distinguishes educational levels according to their selectivity effects. In this respect, the schema claims *functional*

*equivalence* of its educational categories across countries. The criterion of selectivity combines two perspectives: demarcation of typical class-barriers in the educational system on the one hand, and identification of decisive signals for utilisation on the labour market on the other. Following these considerations, the CASMIN schema is constructed as a *certificate-oriented* classification" (Brauns, Scherer & Steinmann, 2003: 222).

**Table 7:** The CASMIN Educational Classification.

Level		CASMIN	Description
Tertiary	High	3b	Higher tertiary education: The completion of a traditional, academically-oriented university education
	Low	3a	Lower tertiary education: Lower-level tertiary degrees, generally of shorter duration and with a vocational orientation
Secondary	High	2c_voc	Vocational maturity: Full maturity certificates including vocationally-specific schooling or training
		2c_gen	General maturity: Full maturity certificates ( <i>e.g.</i> the Abitur, A-levels)
	Mediate	2a_voc	Intermediate vocational qualification, or secondary programmes in which general intermediate schooling is combined by vocational training
		2b_gen	Intermediate general education Academic or general tracks at the secondary intermediate level
	Low	1c_voc	Basic vocational training above and beyond compulsory schooling
		1b_gen	General elementary education
Primary	1a	Inadequately completed general education	Social minimum of education. It generally corresponds to the level of compulsory education

voc=vocational education, gen=general education

Source: Brauns, Scherer & Steinmann, 2003: 223.

The CASMIN Educational Classification is a hierarchically structured measurement of certificates and is two dimensionally separated into general and vocational qualifications (see Table 7). This classification is based on the institutional structure of educational sectors and divides the secondary part into

three hierarchical steps and the tertiary sector into two sub categories of professional oriented certificates and academic degrees.

### **3.3 Hoffmeyer-Zlotnik Educational Classification**

The Hoffmeyer-Zlotnik Educational Classification (Hoffmeyer-Zlotnik, 2003) is also based on recognized school leaving qualifications. National certificates from general and vocational education are combined. Having in mind the average occupational prestige a respondent can obtain on the labor market by the acquired combination of certificates, this classification rank orders the categories by the Standard International Occupational Prestige Scale (SIOPS)<sup>3</sup> developed by Treiman (1977; Ganzeboom & Treiman, 2003). Hoffmeyer-Zlotnik's main argument is that for executing a profession a socially recognized qualification is necessary and of central importance. This obtained qualification leads to a corresponding amount of social reputation as long as the educational institutions are controlled by the state and the achievement of a diploma is required for exercising that profession. Combining educational outcomes and the occupational activity is (at least for modern societies) important, because the accreditation of occupational carriers depends on the achieved educational background.

This classification does not distinguish between sectors of education but covers the various combinations of general and vocational certificates. It allows an overview on the rating of certificates and their close match to occupational prestige in a studied country. Table 8 illustrates the relation between general and vocational education and the average prestige scores of German respondents.

### **3.4 International Standard Classification of Education – ISCED 1997**

The “International Standard Classification of Education – ISCED”, (UNESCO, 1997, 2003) was developed by UNESCO in the seventies. The major aim was to unify statistics on education levels of the population. A first international classification was established at the International Conference on Education in Geneva 1975 and revised in Paris 1979. The actual version of this classification was rebuilt in 1997 and offers a common set of concepts, definitions and classifications establishing a frame for collecting data and presenting comparative indicators on outcomes of the school systems. It covers all teaching and learning activities organized in educational institutions for pupils and adults from pre-school education to continued schooling and training as well as general and

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<sup>3</sup> SIOPS derives from the International Standard Classification of Occupations (ISCO 88) and measures the professional activity of an observed respondent.

vocational education. Seven main categories of this classification serve policy-makers, administrators in educational and cultural management and researchers to compare education across the different systems and across countries.

**Table 8:** Hoffmeyer-Zlotnik Educational Classification demonstrated at the case of Germany.

Code	General Education	Professional Training	average occupational Treiman prestige
1	no basic degree	none	14-20
2	basic degree	none/unfinished	15-20
3	no basic degree	vocational	20-30
4	basic degree	vocational	20-35
5	basic degree	vocational school	20-35
6	middle degree	none/unfinished	20-35
7	middle degree	vocational	25-35
8	middle degree	vocational school	25-45
9	higher degree	vocational	30-40
10	higher degree	vocational school	40-55
11	middle degree	vocational college	50-65
12	higher degree	technical college	50-70
13	higher degree	university, 1 <sup>st</sup> degree, BA	65-75
14	higher degree	university, 2 <sup>nd</sup> degree, MA	70-78
15	higher degree	university, doctorate, Dr./Ph D	70-78

Hoffmeyer-Zlotnik, 2003: 254.

The levels of education (see Table 9) are constructs based on the assumption "that educational programmes can be grouped, both nationally and cross-nationally, into an ordered series of categories broadly corresponding to the overall knowledge, skills, and capabilities required of participants if they are to have a reasonable expectation of successfully completing the programmes in these categories. These categories represent broad steps of educational progression from very elementary to more complex experiences with the more complex the programme, the higher the level of education." (UNESCO 2003: 201)

**Table 9:** International Standard Classification of Education – ISCED 1997, Levels of Education at a Glance (Source: UNESCO, 2003: 203).

Proxy Criteria for Contents		Name of the Level	Code	Complementary Dimensions
Main Criteria	Subsidiary Criteria			
Educational properties, School or centre-based, Minimum age, Upper age limit	Staff qualification	Pre-primary education	0	None
Beginning of systematic apprenticeship of reading, writing and mathematics	Entry into nationally designated primary institutions/programmes, Start of compulsory education	Primary education, First stage of basic education	1	None
Subject presentation, Full implementation of basic skills and foundation for lifelong learning	Entry after some 6 years of primary education, End of the cycle after 9 years since the beginning of primary education, End of compulsory education, Several teachers conduct classes in their field of specialisation	Lower secondary education, Second stage of basic education	2	Type of subsequent education or destination, Programme orientation
Typical entrance qualification, Minimum entrance requirement		(Upper) secondary education	3	Type of subsequent education/destination, Programme orientation, Cumulative duration since beginning of ISCED level 3
Entrance requirement, Content, Age, Duration		Post-secondary non tertiary education	4	Type of subsequent education/destination, Cumulative duration since beginning of ISCED level 3, Programme orientation
Minimum entrance requirement, Type of certification obtained, Duration		First stage of tertiary education (not leading directly to an advanced research qualification)	5	Type of programmes, Cumulative theoretical duration at tertiary, National degree and qualification structure
Research oriented content, Submission of thesis or dissertation	Prepare graduates for faculty and research posts	Second stage of tertiary education (leading to an advanced research qualification)	6	None

### 3.5 Sectors of education

The grouping of levels of education into three sectors is often executed in the censuses of different countries. It is understood as a compliance with the UN classification of standard levels of educational attainment. The used categories (IECM & IPUMS 2006: edu-5-) are

- the primary education,
- the first stage of secondary education,
- the second stage of secondary education,
- the post secondary education.

The use of this scale of schooling varies across the countries according there national educational systems. Countries like Austria do not use the first category, and there are countries like the UK using only the fourth category.

## 4 Problems of misclassification

In the fields of official statistics and of academic survey research, ISCED 1997 is an often used instrument to classify education in an international comparative framework. But the ISCED-classification is not easy to use. Each of the seven levels is classified by criteria for the definition and dimensions for the description of a specific level and program. The levels 2, 3, and 5 are subdivided by programs. These programs are designed for direct access to a higher level (UNESCO 2003: pp. 204-216). Without specific knowledge of the national educational systems and without a basic understanding of the ISCED-classification in national contexts, researchers produce misclassifications because of the complex constructs and combinations at each level. Table 10 shows the different classifications done by OECD, by the European Social Survey national coordinating teams, and by Hoffmeyer-Zlotnik and Warner using the survey data from the ESS round 1 for the countries of Germany (DE), Luxembourg (LU), Denmark (DK), and France (FR).

The ISCED-classification for the European Social Survey is done by the different national coordination teams. Experts for a specific social or political content (but not for education) have classified the survey answers into the common standards of ISCED 1997. Wide differences between ESS and the official statistic from OECD were detected in all categories. However, the differences differ from country to country. Here are the most visible reasons for misclassification:

level 0: In countries with compulsory school attendance until a certain age level, 0 is not possible. In educational systems where graduations are considered as school leaving certificates, pupils can not successfully attain a diploma before ending compulsory school, but they can be selected as respondents for interviews. Some researcher may place those respondents on level 0.

**Table 10:** ESS data<sup>4)</sup> for DE, LU, DK, and FR classified into ISCED 1997 a) by OECD, b) by ESS national coordinating teams and c) by Hoffmeyer-Zlotnik & Warner (in % of the country).

ISCED97 levels	ISCED97 by OECD <sup>3)</sup>	ISCED97 by ESS	ISCED97 by HZ/W
<b>Germany</b> <sup>1)</sup>			
0+1	2	2	2
2	14	14	14
3	52	57	57
4	6	5	5
5	23	20	20
6	2	1	1
Total	100	100	100
<b>Luxembourg</b>			
0+1	19	26	14
2	3	9	13
3	48	38	47
4	6	3	2
5	20	4	23
6	2	20	1
Total	100	100	100
<b>Denmark</b> <sup>2)</sup>			
0+1	1	1	1
2	16	16	16
3	51	49	49
4	n	14	14
5	32	20	20
6	n	1	1
Total	100	100	100
<b>France</b>			
0+1	15	20	14
2	20	30	10
3	41	3	46
4	n	16	0
5	24	12	28
6	x	18	2
Total	100	100	100

- 1) For Germany the ISCED97 by ESS and the ISCED97 by HZ/W column are identical because of the strong collaboration between the ESS national Coordinators and the authors of this paper
- 2) For Denmark we were not able to reclassify the ISCED97 categories, because the Danish ESS used the ISCED levels as response categories during the fieldwork.
- 3) Source: OECD 2006: Education at a Glance, p 37, Table A1.1a
- 4) Population: 25 to 64 years old
- x included in ISCED97 level 5
- n either negligible or zero

level 1: In this category persons are grouped together who left school with a first recognized school leaving certificate but before reaching the lower secondary sector. Some researcher may place people who left school with formal or non basic graduation from school types of the lower secondary sector.

level 2/3: In level 2 and level 3 general education from all school types in the lower (level 2) und upper secondary sectors (level 3) are positioned. Level 3 ends with the university entrance diploma independent from the type of school where the graduation is reached: on public or private schools (upper secondary sector), on general or vocational education.

Level 3 is not only ascertained by general education but also by lower grades of vocational education like the graduation from the dual system apprenticeships.

level 4: "Post secondary, non tertiary" defines all graduations beyond school leaving certificates from general school and/or vocational education in dual system or full-time schools before starting college or university of applied sciences or university.

At this level, the master diploma for craftsmen are clustered. Also, all non general education degrees are located on this level that are necessary to enter university like hands-on training. But only a small group of the European population is concerned by this category.

level 5: This group of education certificates contains all college diplomas and university sanctioned degrees like bachelor and master not leading to an advanced research qualification.

level 6: This highest level is dedicated for all university degrees exclusively for the successful submission of a thesis or dissertation leading to an advanced research position. In some countries, in our example France, the level 5 and 6 are merged together.

In Germany, the authors assisted the German ESS coordinating team recoding the nationally collected data to ISCED 1997 classification. In Denmark the national ESS coordinating team did not use a national measurement instrument for the data collection on education. They fielded a questionnaire offering immediately the ISCED categories as response possibilities to the Danish respondents. Therefore, in Germany and Denmark there is no difference between the classifications of the ESS national coordinating teams and the classification of Hoffmeyer-Zlotnik and Warner. In Luxembourg, however, the national ESS coordinators overestimated graduations at the levels 0 and 1 and they located all different academic degrees at level 6. In France, the national ESS coordinators also overestimated graduations at level 1, they allocated the graduations from level 3 at level 2 and level 4 and they place all persons with a university degree superior to bachelor at level 6.

## 5 Hoffmeyer-Zlotnik/Warner matrix of education: A new instrument for comparing education cross-nationally

The Hoffmeyer-Zlotnik/Warner (HZ/W) matrix of education has the advantage to minimize the errors of misclassifications produced by the other survey instruments. In addition to the institutional typologies presented in chapter 2 we introduce the school leaver's chance to enter the labor force as a complementary dimension to compare education systems across countries. The definition of the HZ/W-matrix is based on the assumption that education is an indicator for a person's qualification or certificated competence to start employment on the labor market at a specific position or at a workplace appereled with a well defined amount of social reputation. In this sense, education, as a combination of general and vocational training, is the entrance to the labor market and to anticipated occupational prestige.

### 5.1 Constructing the Hoffmeyer-Zlotnik/Warner matrix of education, with ten categories

The HZ/W-matrix of general education by vocational education (Table 11) uses the answers of the national questionnaires about the highest general educational level obtained and the highest vocational education degree answered by a respondent. One dimension presents the "general education" and the other axis displays the "professional education" including high school and university diploma. All possible degrees – relevant in the national education system – are rank ordered from not applicable, the lowest level (1) to the highest grade (10).

**Table 11:** Hoffmeyer-Zlotnik/Warner matrix of education – Principles.

vocational education	ISCO major groups	general education – grades, no certificates				
		non	basic degree	second degree	third degree	university-entrance diploma
non dual system	9,8	1	2	3	6	7
vocational school	8,7	4	4	5	5	5
vocational college	4,5	4	4	5	5	5
college of higher education	3,4	0	5	5	8	8
university	2,3	0	0	9	9	9
	2	0	0	0	10	10

The rank order for general education is given by grades of school. These grades in an educational system are orientated at the standard periods statutory prescribed for the different existing school leaving certificates going from basic degree to general qualification for university entrance.

The basic degree reached after class 9 is significantly lower than a basic degree obtained after class 10. But nevertheless each system is characterized by a basic degree as the first recognized diploma that allows entering the labor force with a minimum chance to get a job.

University entrance diplomas have the same significance across all educational systems and in all studied countries. Everywhere these certificates are reached by the end of the upper secondary education. The university entrance diploma is granted after class 12/13 ("Abitur", "Studentereksamen", "baccalauréat", the English "A-levels"). Also, the university entrance right can be reached by an equivalent to a university entrance diploma, obtained by a follow up of degrees stringed together from general and vocational education.

University has the same standing in all compared societies or countries. And by the Bologna declaration – signed in 1999 – "academic degree standards and quality assurance standards throughout Europe for each faculty and its development" were harmonized (Wikipedia 12-11-2006). Therefore, in all our cases, university offers the probable chance to obtain workplaces with the highest occupational prestige.

The rank order for vocational education is given by the major groups, used in the International Standard Classification of Occupations (ISCO-88). The conceptual frameworks of these major groups are skills and the kind of work performed. Skill levels are an estimated order to sort professional classifications and are "defined as the ability to carry out the tasks and duties of a given job" (International Labour Organisation 1990: 2). The occupations are classified by skill levels into the "major groups" of ISCO-88. The "major group" 2 professions are those where an academic qualification is obligatory. The "major group" 3 professions are those of technicians, the "major group" 4 and 5 professions are those of clerks (4) and service workers or salespersons (5), the "major group" 7 professions contain craft and trade workers, the "major group" 8 professions contain plant and machine operators. The occupations sorted in major group 9 are those where no formal qualification is necessary. In this category the low and unskilled labor is listed. Also this dimension of the HZ/W matrix is not built on certificates, but the matrix combines educational attainments to an individual skill level, based on their degree or equivalence. During a social survey interview, we cannot measure skills by tests of competence or occupational capacities. Therefore, we have to interrogate the highest degree of a respondent and combine this to an individual skill level.

The major weight of our matrix is not given by certificates. In the matrix only positions reached on the labor market are the decisive factor. For comparative purposes the matrix offers three anchor points common in each country, the

sanctioned end of basic formation and training, the entrance to universities, and the diploma qualifying for research positions.

The individual qualification level of a person is identified by a weighted numeric value between 1 and 10. Value 1 means that only unskilled positions can be captured in the employment. Code 10 reports that a person has finished university and has a realistic chance to fill in upper work positions with high occupational prestige. "0" indicates that these combinations of general by vocational education are not realistic in social life; the empty cells at Tables 13 to 15 give the information that these combinations are not possible in the observed system of education.

Here the HZ/W-matrix of education with 10 categories is demonstrated. If a graduation of university education is necessary, the categorical system can be fine-tuned by appending a second grade of university. Our basic definition for the matrix of education is the usable quality rating of a combination from general and vocational education for the labor market. Once again, occupational prestige is the important factor and necessity for the adjustment of our matrix.

**Table 12:** Hoffmeyer-Zlotnik/Warner matrix of education – for **Germany**.

vocational education	general education				
	non	basic degree	second degree	third degree	university- entrance diploma
Non	1	2	3	6	7
dual system	4	4	5	5	5
vocational school	4	4	5	5	5
vocational college	0	5	5	8	8
college of higher education	0	0	9	9	9
university	0	0	0	10	10

**Table 13:** Hoffmeyer-Zlotnik/Warner matrix of education – for **Luxembourg**.

vocational education	general education			university- entrance diploma
	non	basic degree	second degree	
non	1	2	3	7
dual system	4	4	5	5
vocational school	4	4	5	5
vocational college	0	5	5	8
college of higher education	0	0	9	9
university	0	0	0	10

**Table 14:** Hoffmeyer-Zlotnik/Warner matrix of education – for **Denmark**.

	general education			
	non	basic degree	second degree	university-entrance diploma
vocational education				
non	1	3	6	7
dual system	4	5	5	5
vocational school	4	5	5	5
vocational college	0	5	8	8
college of higher education	0	9	9	9
university	0	0	10	10

**Table 15:** Hoffmeyer-Zlotnik/Warner matrix of education – for **France**.

	general education		
	non	basic degree	university-entrance diploma
vocational education			
non	1	3	7
dual system	4	5	5
vocational school	4	5	5
vocational college	0	5	8
college of higher education	0	9	9
university	0	0	10

Tables 12 to 15 show the matrices for Germany, Luxembourg, Denmark and France. In each of the four countries the columns are oriented on the possibilities to leave the general educational system. The range lies between the two anchor points: "basic" and "university entrance diploma", the grades are given by "classes". In Germany there are four official "gates" to leave school with a socially recognized diploma. In Luxembourg and Denmark there are only three and in France there are two official "outlets" to leave school with a formal diploma. In Germany, for three of the different diplomas particular types of school are institutionalized in parallel. In the other three countries the school types are organized in sequence following each other. Having finished learning, pupils can leave school system after ending one type or they can start taking classes in the hierarchically following institution.

The numbers of degrees from the system of general education is defined by the official "gates" for leaving the educational system. The position of the columns, especial if one or two columns are not occupied, is given by the numbers of classes a pupil has to complete before reaching the ending "gate". In Luxembourg as well

as in Germany, basic degree comes early: normally at the end of class 9. In Denmark and France, it comes later: normally at the end of class 10; therefore the earlier position here has empty cells. Compared with Germany, in Luxembourg, like in France, a third degree is missing. In France only "basic degree" and "university entrance diploma" are possible "doors" to leave general school and the French basic corresponds to the German and Luxembourg second degree.

Missing national "gates" for leaving general school lead to missing codes on our 10 categories scale. But the not existing codes emphasize the singularity and individuality of the national education scheme. Some school systems (e.g. the German structure) offer a great number of combinations with different prestige to gain; some national arrangements offer fewer patterns in combining general and vocational education. Missing values like the value 2 in Denmark and France and the value 6 in Luxembourg and France only demonstrate that specific diplomas in specific countries are not possible. But in the combination of general and vocational education all combined codes (of certificates and all possible equivalences) are available in each of the countries as representatives of the four European educational systems. Therefore, the matrix can be used in each of the European countries to measure the educational systems in relation to the theoretical probability to achieve a position on the labor market and to gain a position in the social structure of a society.

## **5.2 The validity of the Hoffmeyer-Zlotnik/Warner matrix of education**

Our intention is to measure education as an indicator of the individual's chances on the labor market. Highly qualified persons reach positions in the workforce with high social prestige and vice versa. The higher the correlation between the education measurements and the SIOPS, measuring social prestige, are, the better is the measurement quality of the education variable. Be aware that in the data we are using, SIOPS is combined with the actual job position of the respondents at the time of the interview. During life long work and job activities, a person can have upward and downward experiences in job prestige. In an ideal case, SIOPS should be linked to the first position at the labor market career.

In Germany and Luxembourg, our matrix of educations is stronger correlated with the prestige compared to the alternative measures.

The very low correlation between education and household income in Luxembourg only demonstrates that in Luxembourg earned income is only one component of the household income. In Luxembourg, wages and salaries are household income components with less relevance for the financial situation of the household than in other countries.

In Denmark, all three measures of education show the same correlation with social prestige. Using the two survey questions on general and vocational grades

and constructing the proposed matrix in Denmark, we assume that the interaction between the individual labor market chances and the gained social prestige may increase and the correlation becomes stronger.

In the case of France, where the SIOPS is not available, among all education measures our matrix shows the highest correlation with the monetary categories of the total net household income.

Since in all countries we verify the strong correlation between the matrix of educations and the social prestige position, we argue that our measurement is valid across the countries and can be used for comparative analyses as a socio-demographic background variable. Our matrix is useful to predict the human capital a social actor can change into occupational prestige, social reputation and economic resources valid to obtain a particular position in social stratification.

Table 16 presents the very high correlation of the Hoffmeyer-Zlotnik/Warner matrix with ISCED 1997 measuring the diplomas and school leaving certificates. This confirms in each country the linkage between the formal diplomas their equivalences and the entry into employment quantified by our matrix.

## **6 Conclusion**

Does cross national, cross cultural comparative social research need a new measurement of highest level of education? Looking at the usually applied instruments we found:

“Years of schooling” is an adequate measure for survey researchers interested in “grades”, under the condition that both – interviewer and interviewee – have the concept of “grades” in mind during the interview. Therefore, in comparative surveys the question wording must be highly standardized and the translation into national languages and the implementation in each fieldwork instrument must be carefully monitored to assure that in all observed countries the same fact is measured. But grades can change their value over time and across countries.

ISCED 1997 is in most modern and industrialized countries a useful scheme to classify school leaving certificates for comparative description. In countries with complex educational systems, like Germany, the ISCED 1997 categories cover hardly the social situation of the population entering the labor market. Another disadvantage of ISCED 1997 is the risk of misclassification, how national diplomas are sorted into the ISCED 1997 categories. Even when using the “official” guidelines and mappings of national certificates to ISCED 1997 provided by various national and international working groups, dubious classifications appear. Asking the respondent during a social survey interview to classify his or her highest level of education him- or herself into the ISCED classification increases the interview burden.

**Table 16:** Validity of Hoffmeyer-Zlotnik/Warner matrix of education: Correlations for the 25 to 64 years old population.

<b>Germany</b>				
	HZ/W	years	ISCED97 by HZ/W	SIOPS
Years of education	.77			
ISCED97 by HZ/W	.83	.70		
SIOPS <sup>*)</sup>	.64	.54	.54	
Household income	.35	.35	.35	.33
<b>Luxembourg</b>				
	HZ/W	years	ISCED97 by HZ/W	SIOPS
Years of education	.77			
ISCED97 by HZ/W	.94	.78		
SIOPS <sup>*)</sup>	.61	.56	.58	
Household income	.08	.10	.11	.10
<b>Denmark</b>				
	HZ/W	years	ISCED97 by HZ/W	SIOPS
Years of education	.75			
ISCED97 by HZ/W	.96	.76		
SIOPS <sup>*)</sup>	.50	.49	.51	
Household income	.12	.14	.13	.13
<b>France</b>				
	HZ/W	years	ISCED97 by HZ/W	SIOPS
Years of education	.75			
ISCED97 by HZ/W	.95	.73		
SIOPS <sup>*)1)</sup>	na	na	na	
Household income	.39	.35	.36	Na

\*) SIOPS= Standard International Occupational Prestige Scale by D.J. Treiman

1) SIOPS can not be calculated for France because occupations in France are not classified by ISCO-88

Source: ESS, round 1, computation by the authors

The Hoffmeyer-Zlotnik/Warner matrix of education requires two survey questions. The first question pertains to the highest general education level obtained by the respondents. The second survey question reproduces the highest degree of vocational education achieved at the end of the respondent's initial schooling and training before entering the labor market the first time for a permanent job. The question wording, the list of answer categories, the layout of the questionnaire including the instructions to the interviewer and the guidelines to

the target person of the survey have to respect the various and multifaceted institutional settings of each observed educational system. For each country and every cultural context, the complexity of the school systems, their degree of differentiation and their structural organization, and their vocational training facilities with their own potential to obtain positions on the labor market have to be reflected during the construction of the questionnaire.

In addition to these more or less stable characteristics of the education questions, the interview in social surveys deal with randomly selected sample persons eligible for the interviews belonging to different cohorts leaving the educational systems at different times. This brings more or less dynamic elements into the question design because institutions change over time and in the case of schools and vocational training institutes also the certificates and their potential values change from generation to generation. Therefore the list of answer categories proposed to the survey respondents must display not only the actual degrees but also respondents of past institutional arrangements of learning have to find the adequate denotations in the response categories mapping their highest level of obtained education.

In this article we demonstrated the need to survey general education followed by a question on vocational education. The cross-tabulation of "general", rank ordered by grades, and "vocational", sorted by skill levels, establishes a matrix of educational codes. This way of collecting the information decreases the risk of misclassification into comparative codes on the level of education by the interviewer and/or the data input process, as long as the researcher is guided by the answers given to both questions.

Table 16 shows high correlations between the proposed matrix and the ISCED 1997 classification over all countries. Even for Germany we observe this strong link. This observation confirms the easy use and the low risk of misclassification of our matrix.

A strong relationship between the Hoffmeyer-Zlotnik/Warner matrix of education and "years of schooling" is present in all countries. This linkage between the matrix and "years of schooling" exists also in countries where "grades" are surveyed; and the relation is higher than the connection between the matrix and ISCED 1997.

In Luxembourg and Denmark, total household net income is independent from all used education scales and from occupational prestige measured by SIOPS. A weak relationship between these variables is found in Germany and France.

The new Hoffmeyer-Zlotnik/Warner matrix of education suggests novel opportunities in cross national, cross cultural comparative social survey research. Hopefully, this new measurement of highest level of education will contribute to increase the quality of the measure, its accuracy, and its validity across countries, and its reliability in comparative analyses. In the end, data on educational attainment measured by this matrix can be used as standardized indicators for

human capital, can easily interpreted across countries and within countries where the school institutions and the organization of education have changed over time.

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