

# NEPS Technical Report: Implementation of the ISCED-97, CASMIN and Years of Education Classification Schemes in SUF Starting Cohort 6

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**NEPS Technical Report: Implementation of the ISCED-97, CASMIN and  
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## 1 Introduction

Bearing in mind the variety of utilized questions and possible answers on (in)completed school and vocational episodes, three main educational classification schemes were used to harmonize the given responses and facilitate standard analysis: Firstly, the International Standard Classification of Education in its version of 1997 (ISCED-97)<sup>[1]</sup>, secondly, the Comparative Analysis of Social Mobility in Industrial Nations (CASMIN)<sup>[2][3]</sup> and, thirdly, the years of education. In doing so, each classification scheme was generated on the one hand for the adult target persons of starting cohort 6 and, if stated, on the other hand for the mothers, fathers and partners of these respondents. Due to the fact that the implementation partly varies for the four subjects, not only in the variables and data sources used, but also in the detailed procedure and final data structure, a comprehensive overview as well as a step by step description of the underlying derivation processes is given.

## 2 ISCED-97 classification for the target persons (tx28103)

### 2.1 Data sources and general integration process for the Education file

To obtain the ISCED-97 (and CASMIN/Years of Education) scale scores of the target persons, information from five different data sources had to be integrated:

- spSchool, which holds the general school history (variables used: ts11209, ts11204, ts11204\_v1, ts11204\_ha);
- spVocTrain, which collects the vocational training<sup>1</sup> episode data (variables used: ts15201, ts15219\_ha, ts15291\_g12, ts15218, ts1511m, ts1511y, ts1512m, ts1512y);
- spVocPrep, which provides information on training programs institutionalized as a bridge between school and vocational training (variables used: ts13101, ts13201, ts1311m, ts1311y, ts1312m, ts1312y);
- spSchoolExtExam, which keeps information on additionally achieved, external exam school certificates (variables used: ts1130m, ts1130y, ts11302, wave, exam);
- and spVocExtExam, which holds the same kind of information for vocational trainings (variables used: ts1530m, ts1530y, ts15304, ts15301\_g2, wave, exam).

For the construction of a temporal order of educational transitions in a most reasonable way, the genuine spell-files data (from spSchool, spVocTrain and spVocPrep) have been merged via ID\_t and splink to an already smoothed Biography<sup>2</sup> file. Only the spells containing a correspondent in the Biography file were kept. Then, data from spSchoolExtExam and spVocExtExam have been appended

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<sup>1</sup> This also includes university degrees etc.

<sup>2</sup> This file contains a harmonized spell-structure of all surveyed life course aspects, like school, (vocational) training, employment, parenthood etc. and an indicator (splink) for the origin of the data (see Data Manual, p. 32-34)<sup>[4]</sup>.

to the prior and the resulting data matrix was sorted by the end date<sup>3</sup> of the respective episodes or events<sup>4</sup>. This data-structure served as a frame for the finally provided Education data set. The further derivation process was divided into four main sub-steps:

- At first, the generation of two auxiliary variables to capture general schooling and vocational qualification in an already ISCED-97 (CASMIN) specific categorization;
- These auxiliary variables were carried forward in time within the individual biography to fill the missing information in one of the two<sup>5</sup>;
- The resulting data structure was checked for consistency and especially spells with “falling” schooling degrees<sup>6</sup> were overwritten with the prior higher school degree information.
- All this was necessary for the last step, the final line-by-line combination of the highest school-leaving and last vocational qualifications to derive the final ISCED-97 (CASMIN) scale scores in the correct temporal order.

## 2.2 Detailed variable combinations for the ISCED-97 scale scores in the Education file

On a variable level, ISCED-97 was built in this last step on the following combination of categories: Beginning with the variable for the highest school-leaving qualification, targets with another type of school-leaving qualification (ts11209 = 7) or a residual value (ts11209 = -98, -97, -96, -95, -7) were treated initially as not determinable (“-55”). Concerning terminable statements, respondents with no school-leaving qualification (ts11209 = -21, -20, -6, -5), one from a special needs school (ts11209 = 6) or an elementary school type (ts11209 = ., -98 & ts11204\_ha = 1) were classified into ISCED-97 “0A/1A/1B”. Interviewees with a basic or qualifying school-leaving qualification (ts11209 = 1, 2, ts11209 = -98, 7 & ts11204 = 3, 4, ts11209 = -98, 7 & ts11204\_v1 = 2, ts11302 = 1, 2) or with a successfully completed pre-vocational training course, measurement or year (ts13101 = 1, 2, 3, 4) were categorized into “2B”<sup>7</sup>, those with an intermediate secondary school-leaving qualification (ts11209 = 3, ts11209 = -98, 7 & ts11204 = 5, ts11209 = -98, 7 & ts11204\_v1 = 3, ts11302 = 3) into “2A”, and those with an entrance certificate for a university of applied science or a university

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<sup>3</sup> Either provided by endm, endy in Biography, by ts1311m, ts1311y in spSchoolExtExam or by ts1530m, ts1530y in spVocExtExam.

<sup>4</sup> Furthermore, only harmonized data from subspells with an index “0” and completed spVocPrep (ts13201 ≠ 1) with a duration of at least one year (measured via ts1311m, ts1311y, ts1312m, ts1312y) and spVocTrain spells (ts15218 ≠ -98, 2) were used for construction.

<sup>5</sup> The degrees were mostly reached at different points in time and hence were represented in separate lines of the data matrix for each target person.

<sup>6</sup> This implausible educational history mainly results from the incorrectly reported school-spell information especially regarding ending dates or exam dates of episodes.

<sup>7</sup> Generally speaking, if the residual category was reported for the certificate information (e.g. ts11209 = 7), but informative type or similar information was given elsewhere (like ts11204 = 3) the most likely respective certificate of this track or program type was assumed.

(ts11209 = 4, 5, ts11209 = -98, 7 & ts11204\_ha = 5, ts11302 = 4, 5) into “3A”. Remaining cases were treated as system-missing.

For the variable to capture the last vocational degree, targets with another type of vocational qualification (ts15219\_ha = 17) or a residual value (ts15219\_ha = -99, -98, -97, -95) were treated as not determinable (“-55”), remaining cases as system-missing. Then respondents with no vocational degree (ts15219\_ha = -20, -6, ts15218 = 2) or vocational courses as a further vocational qualification (ts15219\_ha = -98, -95, 17 & ts15201 = 13, 14, ts15219\_ha = 16, sptype = 24, 40 & ts15291\_g12 = 2) were coded to “0” (“no degree”). Targets with a journeyperson's or an assistant's certificate (ts15219\_ha = 1, ts15219\_ha = -98, -95, 17 & ts15201 = 1, ts15304 = 1), an examination by the Chamber of Industry and Commerce (ts15219\_ha = 16 & ts15291\_g12 = 1, ts15304 = 27 & ts15291\_g12 = 1) or one for an ordinary rank within the civil service (ts15219\_ha = 12) were classified into “3B”. The same applies for a vocational qualification from a “Berufsfachschule” or “Fachschule” for health care professions with a duration of less than 24 months (ts15219\_ha = 2 & duration<sup>8</sup> < 24, ts15219\_ha = -98, -95, 17 & ts15201 = 2, 3 & duration < 24, ts15304 = 3) or with a missing value in “duration” (ts15219\_ha = 2 & duration = ., ts15219\_ha = -98, -95, 17 & ts15201 = 2, 3 & duration = .). A vocational degree for a middle rank within the civil service (ts15219\_ha = 13, ts15304 = 24) was categorized into “3C”. “5B” was assigned to respondents with a certificate as Master or Technician, from a “Fachschule”, college of public administration or for a higher rank within the civil service (ts15219\_ha = 3, 4, 5, 6, 14, ts15219\_ha = -98, -95, 17 & ts15201 = 4, 5, 6, 7, 8, ts15304 = 4, 5, 6, 25) or with a degree from a “Berufsfachschule” or “Fachschule” for health care professions with a duration of at least 24 months (ts15219\_ha = 2 & duration >= 24, ts15304 = 2). Interviewees qualified for a senior rank within the civil service (ts15219\_ha = 15; ts15304 = 26), with a degree from a university of applied science or a university (ts15219\_ha = 7, 8, 9; ts15219\_ha = -98, -95, 17 & ts15201 = 9, 10, 11, ts15304 = 10, 11, 12, 13, 14, 15, 16, 17, 18, 19) were coded to “5A”. Those with an additional doctorate or habilitation were classified into “6” (ts15219\_ha = 10, 11, ts15219\_ha = -98, -95, 17 & ts15201 = 15, 16, ts15304 = 20, 21).

Bringing together the codings, only the resulting maximum ISCED-97 scale scores of the two auxiliary variables within each line or point in time were considered for the respondents. Hence, for example, respondents with a “not determinable” school-leaving qualification and no further vocational degree were categorized into “0A/1A/1B”, while respondents with the same vocational information and a school-leaving qualification, leading to “2B”, “2A” or “3A”, were classified within

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<sup>8</sup> The duration was obtained using the start and end date of the vocational episodes given in ts1511m, ts1511y, t1512m, t1512y. Seasonal responses were recoded to the corresponding first month of the season, refusals and don't knows to the mid of the year and occurring responses “End of year” to “December”.

the final ISCED-97 scale to the latter<sup>9</sup>. Considering second cycles, respondents with a school-leaving certificate leading to “3A” and a vocational degree leading to “3B” were coded to “4A”, or “4B”, depending on the chronological order. Here, “4A” includes all respondents with a vocational degree leading to “3B”, followed up by a second school episode with a school-leaving qualification leading to “3A”.<sup>10</sup> Equally, “4B” was used for qualifications reported in the opposite temporal order (cf. Table 1). Finally, only those lines were kept in the resulting Education file, in which the ISCED-97 (and/or CASMIN; see 4.1) classification scale scores changed their values.

### **3 ISCED-97 classification for the mothers, fathers and partners (t731301\_g1, t731351\_g1, ts31212\_g1)**

For the mothers, fathers and partners, it was possible to derive the respective ISCED-97 scales by using one item for the highest school-leaving qualification (m(other): t731301\_ha; f(ather): t731351\_ha; p(artner): ts31212\_ha) and five items for the last vocational degree (m: t731303, t731303\_ha, t731303\_v1, t731310, t731311; f: t731353, t731353\_ha, t731353\_v1, t731360, t731361; p: ts31214, ts31214\_ha, ts31214\_v1, ts31221, ts31222). A prior merge or integration of data-sets was not necessary here - all relevant variables are available in the pTarget or spPartner files.

Like in the derivation for the targets, two auxiliary variables were generated. Beginning again with the highest school-leaving qualification, no such one or one from a special needs school (m: t731301\_ha = -20, -5, 5; f: t731351\_ha = -20, -5, 5; p: ts31212\_ha = -20, -5, 5) were coded to “0A/1A”, a basic or qualifying school-leaving qualification to “2B” (m: t731301\_ha = 1; f: t731351\_ha = 1; p: ts31212\_ha = 1), an intermediate secondary school-leaving qualification to “2A” (m: t731301\_ha = 2; f: t731351\_ha = 2; p: ts31212\_ha = 2) and a school-leaving qualification with an entrance certificate for a university or a university of applied science to “3A” (m: t731301\_ha = 3, 4; f: t731351\_ha = 3, 4; p: ts31212\_ha = 3, 4). Another type of school-leaving qualification or a residual value were treated once again as not determinable (“-55”; m: t731301\_ha = -98, -97, 6; f: t731351\_ha = -98, -97, 6; p: ts31212\_ha = -98, -97, 6), occurring missings by design equally worded as “-54” (m: t731301\_ha = -54; f: t731351\_ha = -54; p: ts31212\_ha = -54).

The same applies to the variables for the last vocational degree with “-55” for another type of vocational qualification or a residual value (m: t731303\_ha = -98, -97, 5; f: t731353\_ha = -98, -97, 5; p: ts31214\_ha = -98, -97, 5) and “-54” for missing by design (m: t731303\_ha = -54; f: t731353\_ha = -

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<sup>9</sup> Another example would be, if a person’s information on the highest school-leaving qualification is missing or not codeable, but the respondent indicates to have a university degree as a further vocational qualification. Here, ISCED-97 was coded “5A”. This assumes, that the target person must had have any type of entrance qualification when starting and completing university studies.

<sup>10</sup> A vocational qualification leading simultaneously to an entrance certificate for a university of applied science or university was treated in the same manner (as “4A”).

54; p: ts31214\_ha = -54). Using the codable information, no vocational qualification (m: t731303\_ha = -20, -5; f: t731353\_ha = -20, -5; p: ts31214\_ha = -20, -5) was categorized into "0" ("no degree"), a certificate from a "Berufsfachschule" (NEPS cases), a "Fachschule" for health care professions (NEPS cases; m: t731303= 4, 5; f: t731353= 4, 5; p: ts31214= 4, 5), for an ordinary rank within the civil service or a completion of an apprenticeship (m: t731303\_ha = 1, t731311 = 1; f: t731353\_ha = 1, t731361 = 1; p: ts31214\_ha = 1, ts31222 = 1) into "3B", an examination for a middle rank within the civil service (m: t731311 = 2; f: t731361 = 2; p: ts31222 = 2) into "3C", a certificate as Master, Foreman, Technician, for a higher rank within the civil service (m: t731303 = 2, t731303\_v1 = 3, t731311 = 3; f: t731353 = 2, t731353\_v1 = 3, t731361 = 3; p: ts31214 = 2, ts31214\_v1 = 3, ts31222 = 3), from a "Berufsfachschule" or "Fachschule" (ALWA cases) or "Fachschule" (NEPS cases<sup>11</sup>; m: t731303 = 6, 7, t731303\_v1 = 2; f: t731353 = 6, 7, t731353\_v1 = 2; p: ts31214 = 6, 7, ts31214\_v1 = 2) into "5B", a university (of applied science) degree or a qualification for a senior rank within the civil service (m: t731303\_ha = 4, t731311 = 4; f: t731353\_ha = 4, t731361 = 4; p: ts31214\_ha = 4, ts31222 = 4) into "5A", and a further doctorate or habilitation (m: t731303\_ha = 4 & t731310 = 1, t731303 = 11; v: t731353\_ha = 4 & t731360 = 1, t731353 = 11; p: ts31214\_ha = 4 & ts31221 = 1, ts31214 = 11) into "6".

Like in the derivation for the targets, only the resulting maxima ISCED-97 scale scores of the auxiliary variables were considered, with few exceptions concerning the treatment of the residual values and missings by design, visible in table 3. Furthermore, in the presence of the combination "3A" as highest school-leaving qualification and "3B" as last vocational degree (second cycles) "4A" was given to the concerning subjects.<sup>12</sup>

#### 4 CASMIN classification

The derivation processes of CASMIN scale scores was similar to the steps leading to the ISCED-97 classification introduced above. It started with generating two auxiliary variables for the highest school-leaving and last vocational qualification, and subsequently, obtaining the CASMIN scale scores by combining them. Considering a relationship between the ISCED-97 and CASMIN classification, it was possible to use the auxiliary variables of the former as a starting point for the corresponding ones of the latter, supplemented by some CASMIN-specific modifications.

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<sup>11</sup> The distinction between ALWA and NEPS cases was necessary because for ALWA cases no additional information can be used for a more selective differentiation between a vocational qualification from a "Berufsfachschule" or "Fachschule". The convention applied here creates some upward bias in ISCED-97 scores in these special cases from ALWA, but there is no perfect remedy for the data shortcomings.

<sup>12</sup> Information on the temporal order of events was not available for parents and partners, since only the highest degrees were collected. Therefore no further differentiation between second cycles "4A" and "4B" was possible, and "4A" was used as a reference.



#### **4.1 CASMIN specific combinations/modifications for the target persons (tx28101)**

In a first step, the two auxiliary ISCED-97 variables already present in the Education file frame (see section 2.1) were cloned. Then the cloned variable with the information on the highest school-leaving qualification of the respondents was recoded to a missing for those who only successfully completed vocational training course, measurement or year (ts13101 = 1, 2, 3, 4), as no appropriate equivalent qualification in the CASMIN scheme is given. Otherwise, no further modifications were necessary for the general schooling CASMIN auxiliary variable. For the CASMIN auxiliary variable capturing the last vocational degree, it was feasible to keep the information not determinable and no vocational qualification in the clone. Furthermore, interviewees with an ISCED-97 of “3B”, “3C” and “5B” were summarized into only one new category, containing those with a vocational specific schooling or training. Indeed, it was not practicable to use the given information to capture study participants with a vocational degree from a university of applied science or a university. Here, it was necessary to generate two new categories, consisting of respondents with either a degree from a university of applied science (ts15219\_ha = 7, ts15219\_ha = -98, -95, 17 & ts15201 = 9, ts15304 = 10) or a university (ts15219\_ha = 8, 9, 10, 11, 15, ts15219\_ha = -98, -95, 17 & ts15201 = 10, 11, ts15304 = 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 26). Remaining cases were treated as a system-missing value. The final CASMIN scale scores were derived afterwards along the combinations as shown in table 2.

#### **4.2 CASMIN specific combinations/modifications for the mothers, fathers and partners (t731301\_g2, t731351\_g2, ts31212\_g2)**

For the CASMIN scores of mothers, fathers and partners of the study participants, it was feasible to use the corresponding ISCED-97 variables for the highest school-leaving qualification without any further modifications. As for the respondents, the corresponding variables for the last vocational degree were gained by combining those with an ISCED-97 of “3B”, “3C” and “5B” to a new category. In a first step, mothers, fathers and partners with a degree from a university of applied science or a university were obtained by combining “5A” and “6”. Because “5A” includes not only those with a degree from a university of applied science but also from a university, the respective degrees were distinguished from each other within a subsequent step through recoding all concerning subjects into a new category, if a degree from a university of applied science was stated explicitly (m: t731303\_v1 = 4, t731303 = 14, t731303 = 8, 9, 10, 11 & t731308 = 3; f: t731353\_v1 = 4, t731353 = 14, t731353 = 8, 9, 10, 11 & t731358 = 3; p: ts31214\_v1 = 4, ts31214 = 14, ts31214 = 8, 9, 10, 11 & ts31219 = 3). The final CASMIN scores were derived again along the combinations as shown in table 4.

## 5 Years of education classification (tx28102, t731301\_g3, t731351\_g3, ts31212\_g3)

Completing the harmonization process, the years of education were gained from the given data. For this purpose a function based on the CASMIN classification scheme was employed to maintain the corresponding scale scores for the respective targets. Generally, drawing from the categories of the CASMIN scheme, “1b” was assigned to 9, “1c” to 12, “2b” to 10, “2a” and “2c\_gen” to 13, “2c\_voc” to 15, “3a” to 16 and “3b” to 18 years of education. Respondents, mothers, fathers and partners with neither a school-leaving nor a vocational qualification (“1a”) were given the residual value of “-20”, due to the fact that having no school-leaving qualification cannot be equated to a certain number of years of education<sup>13</sup>. Finally, those with no codable, a missing or a missing by design CASMIN-scale score were treated exactly the same within the years of education scheme.

## References

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- [2] König, Wolfgang/ Lüttinger, Paul/ Müller, Walter (1988): A Comparative Analysis of the Development and Structure of Educational Systems. Methodological Foundations and the Construction of a Comparative Educational Scale. CASMIN-Working Paper No. 12.
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<sup>13</sup> Imagine, for example, migrants, whose school attendance periods differ from the German compulsory one or whose certificates were not acknowledged.

**Table 1: ISCED-97 Targets**

		Vocational qualification						
		Not determinable, Missing	No qualification, Vocational courses (0A/1A/1B)	Assistant's certificate, Ordinary civil service, ... (3B)	Middle civil service (3C)	Technician, Master, Higher civil service, ... (5B)	University (of applied science), Senior civil service (5A)	Doctorate, Habilitation (6)
School-leaving qualification	Not determinable, Missing	-55	0A/1A/1B	3B	3C	5B	5A	6
	No qualification, Special needs school, Elementary school (0A/1A/1B)	0A/1A/1B	0A/1A/1B	3B	3C	5B	5A	6
	“Hauptschule”, Vocational training (2B)	2B	2B	3B	3C	5B	5A	6
	Intermediate secondary school (2A)	2A	2A	3B	3C	5B	5A	6
	Entrance certificate university (of applied science) (3A)	3A	3A	4A/4B	3C	5B	5A	6

**Table 2: CASMIN Targets**

		Vocational qualification				
		Not determinable, Missing	No vocational qualification	Vocational specific schooling	University of applied science	University
School-leaving qualification	Not determinable, Missing, Vocational training	-55	1a	1c	3a	3b
	No qualification, Special needs school, Elementary school	1a	1a	1c	3a	3b
	“Hauptschule”	1b	1b	1c	3a	3b
	Intermediate secondary school	2b	2b	2a	3a	3b
	Entrance certificate university (of applied science)	2c_gen	2c_gen	2c_voc	3a	3b

**Table 3: ISCED-97 Targets' mothers, fathers and partners<sup>14</sup>**

		Vocational qualification							
		Missing	Not determinable	No qualification, Vocational courses (0A/1A/1B)	Assistant's certificate, Ordinary civil service, ... (3B)	Middle civil service (3C)	Technician, Master, Higher civil service, ... (5B)	University (of applied science), Senior civil service (5A)	Doctorate, Habilitation (6)
School-leaving qualification	Missing	Missing	-55	0A/1A	3B	3C	5B	5A	6
	Not determinable	-55	-55	0A/1A	3B	3C	5B	5A	6
	No qualification, Special needs school, Elementary school (0A/1B)	0A/1A	0A/1A	0A/1A	3B	3C	5B	5A	6
	"Hauptschule", Vocational training (2B)	2B	2B	2B	3B	3C	5B	5A	6
	Intermediate secondary school (2A)	2A	2A	2A	3B	3C	5B	5A	6
	Entrance certificate university (of applied science) (3A)	3A	3A	3A	4A	3C	5B	5A	6

<sup>14</sup> Missings by design "-54" can occur - by design - only simultaneously and the resulting score is, of course, also "-54" – missing by design; for simplicity this line and row was left out of the table.

**Table 4: CASMIN Targets' mothers, fathers and partners<sup>15</sup>**

		Vocational qualification					
		Missing	Not determinable	No vocational qualification	Vocational specific schooling	University of applied science	University
School-leaving qualification	Missing	Missing	-55	1a	1c	3a	3b
	Not determinable	-55	-55	1a	1c	3a	3b
	No qualification, Special needs school, Elementary school	1a	1a	1a	1c	3a	3b
	“Hauptschule”, Vocational training	1b	1b	1b	1c	3a	3b
	Intermediate secondary school	2b	2b	2b	2a	3a	3b
	Entrance certificate university (of applied science)	2c_gen	2c_gen	2c_gen	2c_voc	3a	3b

<sup>15</sup> Missings by design “-54” can occur - by design - only simultaneously and the resulting score is, of course, also “-54” – missing by design; for simplicity this line and row was left out of the table.