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Documentation on ISCED generation using the CAMCES tool in the IAB-SOEP Migration Samples M1/M2

Roberto Briceno-Rosas, Elisabeth Liebau, Verena Ortmanns, Lisa Pagel, Silke L. Schneider

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1. Introduction

Starting with wave (v33) 2016 of the SOEP survey, the Socio-Economic Panel (SOEP) offers another ISCED variable to measure the highest educational qualification achieved (see documentation on ISCED in the SOEP) in specific subsamples (starting with M1 and M2) in addition to the standard generated variables on educational levels in ISCED. The new variable is not based on information from the education questions for migrants commonly asked in the SOEP, which are not country-specific, but is surveyed using a new instrument that allows respondents to select their specific educational qualification from a database covering the education systems of a large number of countries. In the following, we describe the database surveying of educational degrees using the CAMCES tool and how this is carried out in the SOEP context. By comparing results from the two surveying procedures, identifying discrepancies between them, and discussing the advantages and disadvantages of each, we aim to help users decide which of the ISCED variables presented here are best for their research questions. We conclude by describing the newly provided variables, their content and values.

2. Measuring educational attainment in migrant surveys

The individual's educational attainment is a core social background variable not only in the SOEP but in social science surveys in general. Educational attainment is usually measured by means of a closed question on the highest educational qualification achieved, providing a limited number of fixed-response categories containing the most common qualifications in the country of survey.

This measurement strategy does not work well in the case of migrants. Depending on their age at migration, migrants have in many cases obtained their educational qualifications in their country of origin. A common practice is to ask respondents with foreign educational qualifications to indicate the "equivalent" qualification in the educational system in which the survey is being conducted. This is especially popular in general population surveys. This is difficult, however, for many migrant respondents, especially those who arrived relatively recently in the host country or who have not (yet) had much contact with the education system or labor market there. As another measurement strategy, the IAB-SOEP Migration Sample instead offers a list of categories that are generic descriptions of educational levels, which are assumed to be understood universally by respondents from various backgrounds. However, this alternative strategy is also not without problems either. Language ability and cultural differences in the understanding of constructs underlying a survey question may introduce measurement error (see, e.g., Kleiner, Lipps, & Ferrez, 2015). For example, generic terms such as "primary education" or "compulsory education" refer to different durations of schooling in different countries, and secondary education includes vocational training in some countries but not in others. As neither measurement approach takes into account institutional differences between educational systems across the world, large amounts of measurement error are likely (see also Schneider, 2018).

The "Computer-Assisted Measurement and Coding of Educational Qualifications in Surveys (CAMCES)" project, funded by the Leibniz Association and conducted at the GESIS Leibniz Institute for the Social Sciences, tackled the issue of measurement and coding of educational attainment in cross-cultural (including migrant) surveys. The goal of the project was to develop a tool for computer-based

surveys facilitating the measurement and coding of educational qualifications across countries. This new survey tool uses country-specific education categories and also offers their cross-national harmonization. It was introduced in the Socio-Economic Panel Migration Samples in addition to the generic measure included in the individual questionnaire to improve measurement quality and thereby comparability across respondent groups from different countries of origin. Respondents thus directly report their foreign qualifications rather than inferring equivalence with qualifications in Germany or assuming a universal understanding of generic categories. The foreign qualifications are harmonized using the International Standard Classification of Education (ISCED, UNESCO-UIS 2012).

3. The CAMCES tool

The CAMCES tool combines (1) a short questionnaire module in which the countries in which respondents obtained their highest qualification are identified, (2) an international database of educational qualifications and their classification, and (3) two survey interfaces that dynamically show relevant response options from the database in the questionnaire. It thereby offers response categories that are relevant for the educational system in which a respondent completed her/his education. While both a web survey and CAPI version have been developed, the CAPI version was implemented in the IAB-SOEP Migration Sample.

3.1 The questionnaire module

The CAMCES questionnaire module has at its core a question asking respondents to state their educational attainment, but also a question designed to identify the relevant educational system as well as some optional questions. While the CAMCES project developed the questionnaire module for general population samples, an adapted version was developed specifically for the IAB-SOEP Migration Sample. The following questions were implemented in the IAB-SOEP Migration samples in 2015 (M1) and 2016 (M2):¹

- [EDU_1/edqflt]: Filter question asking whether respondent obtained any educational qualifications abroad. If not, the respondent is routed to leave the CAMCES questionnaire module.
- [EDU_2/edqymb] Question asking how many educational qualifications the respondent has obtained abroad in total. This question may be of interest in checking whether the right number of loops (see [EDU_7/edqflt2]) was used.
- [EDU_3/edqctxall] This semi-open question aims to identify the educational system in which the respondent obtained her/his highest educational qualification. For this purpose, a list of country names is provided that was agreed upon between the CAMCES and SOEP teams in 2014 based on M1 countries of origin. A list of radio buttons for the different countries was implemented. In multi-lingual countries such as Kosovo and the Ukraine, the list is broken

¹ The first part in brackets indicates the name of the question and variable in the SOEP Migration Sample. The second part indicates the name of the question (or equivalent question) in the CAMCES questionnaire module.

down further, differentiating among the languages in which the educational qualifications can be reported. For countries which were not yet part of the education database, respondents are requested to enter the name of the country in a text box. These respondents are next routed to [BIL_4AL].

- [TEDU1/edqcbint and TEDU2/edqstint] Since the following question needs to be self-administered rather than interviewer-administered, an introduction is provided for CAPI surveys like the SOEP. It differs slightly depending on which interface (see 3.3) is shown to the respondent, which depends on whether the language in which the respondent will report his/her qualification uses a Latin or other alphabet (e.g., Greek or Cyrillic).
- [BIL_4/edq] The actual question on the highest educational qualification obtained. The response options are dynamically fed in from the database (see 3.2) through the interfaces (see 3.3). From the response to this question, the distributed ISCED variables (see 3.4) are generated.
- [BIL_4AL and BIL_5/edqopn] For countries not (yet) covered in the database, and respondents who did not generate valid data using the CAMCES interfaces (see 3.3), an open question is offered for respondents to name their qualification.
- [BIL_6/edqyr] The year in which the educational qualification mentioned in [BIL_4/edq] or [BIL_4AL/BIL_5/edqopn] was obtained.
- [EDU_7/edqflt2] Whether the respondent has obtained any other educational qualifications abroad. If not, the respondent is routed to leave the CAMCES questionnaire module.
- [EDU_8/edqctxxx2] If yes, he/she is asked whether this qualification was received in the same country (as previously reported in [EDU_3/edqctxall]) or in a different country. If in a different country, the respondent is routed back to question [EDU_3/edqctxall], otherwise directly to question [BIL_4/edq]. In the loop, there are slight changes in wording to reflect that we are no longer talking about the highest educational qualification. The question module was looped up to another three times so respondents could report up to four qualifications.

For the IAB-SOEP Migration Samples, all questions apart from [BIL_4/edq] were part of TNS Infratest / Kantar Public's programming in the CAPI software nipo. [BIL_4/edq] is implemented using the external CAMCES CAPI software application, which is started from the previous question in nipo.

3.2 The database

The CAMCES database consists of three major parts:

- It contains information on educational systems, mainly corresponding to countries or nation-states (including countries that do not exist anymore today, such as the Soviet Union) and in some cases further differentiated by region and language, as well as information on the alphabets used in these languages. This ensures that only relevant database entries are shown to respondents, and if the alphabet is not Latin, it ensures that only the search tree interface (see section 3.3) is shown. The same countries of origin were offered in 2015 (M1) and 2016 (M2) and are shown in Table 1. This information was manually fed into [EDU_3/edqctxall].

- The central part of the database is a table listing all educational qualifications in the relevant languages and their classification codes, for all countries covered by the database. If information is available on outdated qualifications, they are covered in the database as well. In addition, alternative expressions are included when several terms—e.g., official and colloquial—are used for the same qualification. The structure of the search tree (see section 3.3) is also defined in this table of the database.
- The database includes detailed codes for the International Standard Classification of Education (ISCED) 1997, 2011 as well as an “alternative version” of ISCED 2011, developed by the CAMCES team. These codes were attached to survey responses resulting from question [BIL_4/edq] (see 3.1) via a simple recode syntax from detailed qualification code to harmonized code. For more information on these classifications and the variables offered, see section 3.4.

Table 1: Countries covered in CAMCES Database Version 0.2 (2015)

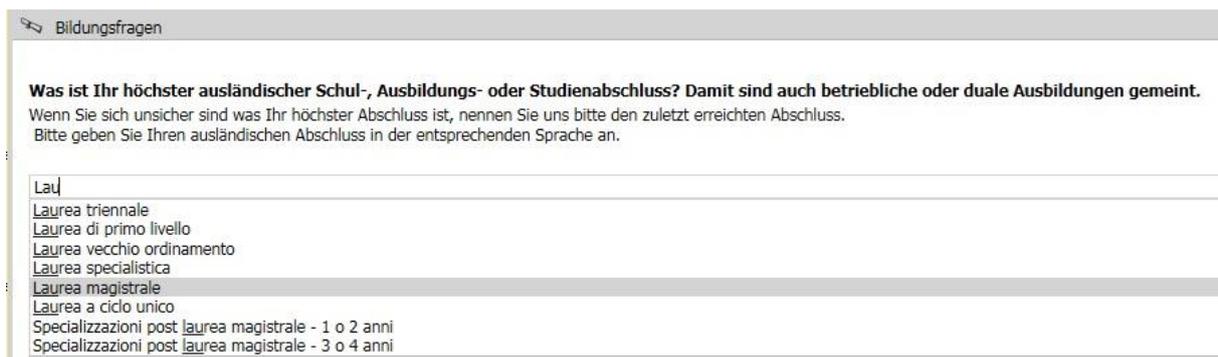
Country	Languages
Albania	Albanian
Belarus	Russian
Bosnia and Herzegovina	Bosnian
Bulgaria	Bulgarian
Croatia	Croatian
Czech Republic	Czech
Czechoslovakia	Czech, Slovak
France	French
Greece	Greek
Hungary	Hungarian
Italy	Italian
Kazakhstan	Russian
Kosovo	Albanian, Serbian
Macedonia	Macedonian
Montenegro	Montenegrin (Latin)
Montenegro	Serbian (Cyrillic)
Norway	Norwegian
Poland	Polish
Portugal	Portuguese
Romania	Romanian
Russian Federation	Russian
Serbia	Serbian
Slovakia	Slovak, Hungarian
Slovenia	Slovenian
Soviet Union	Russian
Spain	Spanish
Turkey	Turkish
Ukraine	Ukrainian, Russian
Yugoslavia	Serbian

3.3 The interfaces

The CAMCES interfaces allow respondents to report their educational qualifications using the educational database in an intuitive and ordered manner. The entries shown to a respondent relate to the educational system he or she was educated in, as indicated in [EDU_3/edqctxall]. One can search the database either by typing or by using a structured list. The respective user interfaces are the “combination box” and the “search tree”.

The *combination box* allows respondents to dynamically search for their educational qualification in the database by typing and selecting an entry from a list of database matches (see Figure 1). This interface is only offered to the respondent if the reporting language corresponding to the education system selected in question [EDU_3/edqctxall] (see 3.1) uses a Latin alphabet, meaning that the keyboard settings do not need to be changed during the CAPI interview. In the version implemented in the 2015 and 2016 IAB-SOEP Migration Sample, this looks similar to an empty text box, as if it were an open question.² Respondents are asked to enter the response into the box. With each letter they type, a request to the database is submitted, i.e., the written response is matched with the educational qualifications in the database (text string matching). The results retrieved from the database request are presented below the text field. The number of results decreases as the respondent continues typing. Respondents can then select the best match from the resulting list of educational qualifications. If no matching educational qualification is found, or if the respondent does not make a selection among the results offered, the typed text is saved as a text string as it would be for an open question. Both interfaces can host more response categories than a simple show card, which is desirable because of the ever-increasing degree of differentiation of educational systems.

Figure 1: CAMCES tool “combination box” interface (example shows qualifications in Italy in a German-language survey environment)



Bildungsfragen

Was ist Ihr höchster ausländischer Schul-, Ausbildungs- oder Studienabschluss? Damit sind auch betriebliche oder duale Ausbildungen gemeint.
Wenn Sie sich unsicher sind was Ihr höchster Abschluss ist, nennen Sie uns bitte den zuletzt erreichten Abschluss.
Bitte geben Sie Ihren ausländischen Abschluss in der entsprechenden Sprache an.

Lau

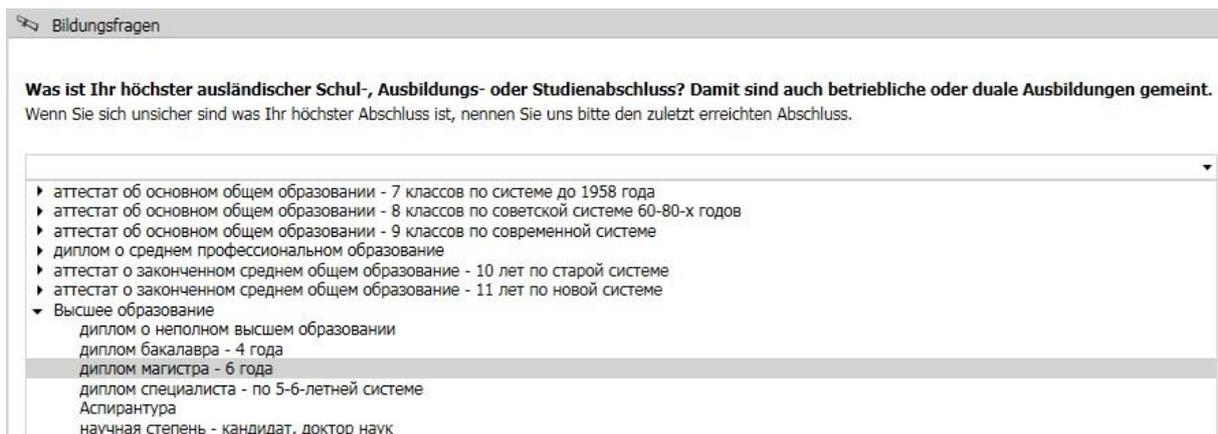
- Laurea triennale
- Laurea di primo livello
- Laurea vecchio ordinamento
- Laurea specialistica
- Laurea magistrale
- Laurea a ciclo unico
- Specializzazioni post laurea magistrale - 1 o 2 anni
- Specializzazioni post laurea magistrale - 3 o 4 anni

The search tree is similar to show cards or response lists in standard educational attainment questions. This can help respondents who cannot spontaneously name their highest foreign educational qualification. A search tree can accommodate a larger number of response options than a

² This was improved in the next version of the CAMCES CAPI software, which was implemented in the SOEP Migration Samples 2017 and 2018, by including a looking glass next to the text field as well as a watermark reading “search” in the required language in the text field itself.

show card because of its nested structure (see Figure 2). In order to be manageable for respondents, the search tree is limited to two levels. The response categories are structured in a way that optimizes the representation of the selected educational system for respondents (rather than following an ISCED, which could potentially lead to a non-intuitive representation of educational qualifications for respondents). The first level offers country-specific summary terms such as “secondary education” or “university degree”. When respondents click on a first-level entry, it expands and reveals the different qualifications within this group (for example, bachelor's, master's and PhD degrees within the university degrees section). The search tree is used as a fallback option for respondents who did not make a valid selection using the combination box, for example, if they could not name their educational qualification and left the combination box empty, if the text entered did not generate any matches with the database, or if the respondent did not select any of the matches. Also, the search tree interface is used exclusively (i.e., the combination box is skipped) when the alphabet of the language of the selected educational system does not correspond to the keyboard used during the survey, for instance, when interviewing Russian or Greek migrants in the IAB-SOEP Migration Sample.

Figure 2: CAMCES tool “search tree” interface (example shows qualifications in the Russian Federation in a German-language survey environment)



3.4 ISCED variables generated using the CAMCES tool

The following International Standard Classification of Education (ISCED) variables were generated from detailed educational qualification codes generated using the CAMCES tool:

- [Isced11_camces] Official ISCED 2011 (see OECD, Eurostat & UNESCO-UIS, 2015; UNESCO-UIS, 2012). This is a three-digit variable indicating not just the level of education but also, for instance, the educational orientation (general vs. vocational). If we could not find an official code for a qualification in the ISCED mappings (Eurostat, 2013; UNESCO-UIS, 2016), which is common with outdated qualifications, a standard missing code 9000 is used.
- [isced97_camces] Official ISCED 1997 (see OECD, 1999; UNESCO-UIS, 1997 [2006]). Here we only provide the main level of ISCED as indicated in the ISCED mappings (Eurostat, 2013; UNESCO-UIS, 2016; UNESCO, OECD and Eurostat, 2008). Again, the code 9000 indicates that there is no official code for a qualification.

- [iscsed97a_camces, Isced11a_camces] For both ISCED 1997 and ISCED 2011, we provide alternative ISCED variables developed by the CAMCES team. The difference between these and the official ISCED variables is that, first, we developed valid codes for educational qualifications not documented in the official ISCED mappings (e.g., outdated qualifications). Second, when we had reasons to doubt the official ISCED code,³ e.g., after consultations with country experts (see also Schneider, 2008), we developed an alternative, “unofficial” code. The alternative ISCED variables are intended to improve cross-national comparability over the official ISCED variables. Most of the codes in the alternative variables are, however, identical to the codes in the official variables.

4. Survey modalities

The CAMCES tool developed by GESIS was used in the 2015 SOEP survey with subsample M1 and in 2016 with subsample M2, in both cases with respondents who had already taken part in the survey at least once and had stated that they had completed vocational or higher education abroad. This filter excludes all those from the CAMCES instrument who only have a foreign general school-leaving certificate (but no vocational or higher education) for which the CAMCES tool could have been used to obtain an ISCED value (and which is provided starting in 2017). The same version of the questionnaire was used (see Annex A) as a basis for this, and it was presented to respondents at the end of the individual questionnaire.

Table 2: Overview of survey modalities

Specific module (see Annex)	Subsamples	Survey year	Filter group	Information surveyed	Contained in data release
A	M1	2015	Only repeat respondents who stated in previous years having completed vocational or higher education	Highest educational qualification achieved (school, vocational or higher education)	2017
A	M2	2016			2017

5. Comparing the results from the IAB-SOEP education questions and the CAMCES tool

A very interesting question is, of course, to what degree the ISCED codes derived from the two different measurement instruments overlap. Since some categories in the IAB-SOEP measure are ambiguous, and the English, Polish, Romanian, Turkish, and Russian language versions also differ somewhat due to the difficulty of translating education-related terms, we do not expect that both

³ The official ISCED mappings are developed in a decentralized process by education ministries and statistical offices, with various degrees of expertise and political influence, and with little oversight from international organizations such as UNESCO, OECD, or Eurostat, with the result that they are sometimes not optimal in terms of comparability.

measures correspond completely. Also, we should keep in mind that the reliability of education measures, as is the case for any survey measure, is not perfect (Porst and Zeifang, 1987), and even applying the IAB-SOEP or CAMCES measures twice would lead to inconsistencies.

Table 3: ISCED codes for the IAB-SOEP education measure

ISCED categories		IAB-SOEP instrument 2013 / 2014	
		School-leaving certificate	Vocational training and higher education
ISCED 0-1	Less than lower secondary education	left school without certificate	no answer other on-the-job-training in the company
ISCED 2	Lower secondary education	completed compulsory school with certificate	no answer other on-the-job-training in the company
ISCED 3 general	General upper secondary education	completed secondary school with certificate	no answer other on-the-job-training in the company
ISCED 3 vocational	Vocational upper secondary education	left school without certificate	longer vocational training in a company attended a vocational school
		completed compulsory school with certificate	longer vocational training in a company attended a vocational school
ISCED 4	Post-secondary non-tertiary education	completed secondary school with certificate	longer vocational training in a company attended a vocational school
ISCED 5	Short-cycle tertiary education	-	-
ISCED 6-7	Tertiary education Bachelor and Master levels	any	higher education with a rather practical focus
			higher education with a rather theoretical focus
ISCED 8	Doctoral level	any	doctoral studies

This section will first look at the distributions of each variable and then look at the joint distribution. In the case of the CAMCES measures, if a respondent reported his or her highest qualification not in the first but in one of the subsequent loops, we use the higher educational qualification from the later loop. When looking at the joint distribution, we use a somewhat more detailed code for the CAMCES measure but show which ones correspond to which ISCED codes derived from the IAB-SOEP measure. How ISCED codes were derived for the generic IAB-SOEP measure is shown in Table 3⁴ above.

⁴ Only cases with valid information on both measures were analysed. The CAMCES measure has a substantial amount of missing data due to panel attrition (N=1231 in 2015 and N=593 in 2016), missing data due to a too narrow filter question (N=709 in 2015 and N=369 in 2016), missing data on the filter question of whether respondent has foreign vocational/higher education qualifications (N=3 in 2015, 0 in 2016), and respondents saying “no” on this item but who could have foreign general qualifications that would have been covered in the CAMCES database (N=41 in 2015 and N=22 in 2016), item nonresponse to the question on country of

As Table 4 shows, the distribution of ISCED differs across measures. The CAMCES measure finds substantially more respondents with vocational upper secondary (ISCED 3) education, and substantially fewer with post-secondary non-tertiary (ISCED 4) education. ISCED level 4 is very small in most countries (see, e.g., OECD, 2017, Indicator A1, showing an OECD average of 5%), which adds credibility to the CAMCES measure. The IAB-SOEP measure cannot identify ISCED level 5 because no generic response option corresponding to advanced vocational qualifications below the bachelor's degree level were provided (in Germany, ISCED level 5 qualifications are, e.g., the *Meister* and *Techniker*, i.e., master craftsman and technician qualifications). The low proportion of respondents with qualifications below ISCED 3 on both measures can be explained by routing, i.e., only respondents who said that they have foreign vocational or higher education qualifications, which usually do not exist at level 1, were routed into the CAMCES module.

Table 4: Distributions of ISCED derived from generic IAB-SOEP and CAMCES measures

	generic IAB-SOEP measure		CAMCES measure		
	Frequency	%	Frequency	%	% coded like IAB-SOEP measure
ISCED 0	20	1.8	5	0.4	1.3
ISCED 1			10	0.9	
ISCED 2	137	12.1	122	10.7	10.7
ISCED 3 vocational	176	15.5	237	20.9	20.9
ISCED 3 general	179	15.8	148	13.0	13.0
ISCED 4	191	16.8	94	8.3	8.3
ISCED 5	0	0	108	9.5	9.5
ISCED 6			87	7.7	
ISCED 7	409	36.0	306	26.9	34.6
ISCED 8	24	2.1	19	1.7	1.7
Total	1136	100.0	1136	100.0	100.0

Table 5 reports the joint distribution of both measures in a cross-tabulation and allows a more thorough analysis of their correspondences.

education (n=2 in 2015), countries of education not (yet) covered in the CAMCES database (N=125 for 2015 and N= 189 for 2016), item nonresponse (N=8 in 2015 and N=7 in 2016) and responses that could not be automatically coded (N=66 in 2015 and N=21 in 2016).

Table 5: Cross-tabulation of ISCED derived from CAMCES and IAB-SOEP measures (row percentages)

		ISCED derived from IAB-SOEP migration sample measure								Total
		0-1	2	3 vocational	3 general	4	5	6-7	8	
ISCED derived from CAMCES	0	0.0	20.0	20.0	40.0	0.0	0.0	20.0	0.0	100.0
	1	10.0	30.0	20.0	30.0	10.0	0.0	0.0	0.0	100.0
	2	5.7	35.2	27.0	12.3	17.2	0.0	2.5	0.0	100.0
	3 vocational	2.5	14.3	24.9	24.5	28.7	0.0	5.1	0.0	100.0
	3 general	2.7	16.9	14.9	33.1	17.6	0.0	14.2	0.7	100.0
	4	2.1	7.4	22.3	12.8	39.4	0.0	14.9	1.1	100.0
	5	0.0	12.0	28.7	10.2	26.9	0.0	22.2	0.0	100.0
	6	0.0	4.6	2.3	9.2	3.4	0.0	79.3	1.1	100.0
	7	0.0	2.3	1.3	6.9	2.0	0.0	84.6	2.9	100.0
8	0.0	0.0	5.3	0.0	0.0	0.0	31.6	63.2	100.0	
Total		1.8	12.1	15.5	15.8	16.8	0.0	36.0	2.1	100.0

All in all, 49% of cases are classified consistently, regardless of whether the IAB-SOEP or the CAMCES measure is used. Interestingly, there is no upward or downward bias in either measure, with CAMCES leading to a higher ISCED code than the IAB-SOEP measure in 25% of the cases, and a lower code in 26% of the cases.

We find the highest mismatch between measures for the lowest education category: Only 7% of the cases coded as ISCED 0-1 (at most primary education completed) using the CAMCES measure are coded in the same way in the IAB-SOEP measure. The case numbers are very low, however, and measurement error is probably rather high: these respondents are not actually expected to get to the CAMCES module because the questionnaire routing only routed respondents with foreign vocational qualifications into the module who are generally higher than ISCED level 1.

Regarding ISCED level 2, a large proportion (27%) of respondents coded here using the CAMCES tool are coded as ISCED 3 vocational in the generic IAB-SOEP measure. It is possible that what these respondents report as “longer vocational training in a company” or “vocational school” in the IAB-SOEP measure of vocational and higher education does not constitute vocational education at the upper secondary level in ISCED, for example, because the program is not long enough (note that the IAB-SOEP instrument does not indicate what exactly “longer” is supposed to mean). In fact, some countries offer vocational education and training at the lower secondary level, or vocational programs that are too short to count as completion of upper secondary education. The CAMCES tool can differentiate the resulting qualifications from vocational education and training at the upper secondary level. Furthermore, some respondents coded as having completed lower secondary education in CAMCES are coded as upper secondary general completers in the generic IAB-SOEP measure. This may result from the fact that the response option “completed secondary school with certificate” in the IAB-SOEP measure may be interpreted as having completed whatever is *lower* secondary education in the country of origin of the respondent, especially when the response option “completed compulsory school with certificate” in that country refers to less than lower secondary education. The cases

classified at ISCED 4 in the IAB-SOEP measure but ISCED 2 in CAMCES likely result from a combination of these two issues.

Respondents reporting a vocational upper secondary qualification using the CAMCES tool are distributed almost evenly across three IAB-SOEP categories: vocational and general upper secondary (ISCED 3) and post-secondary non-tertiary education (ISCED 4). The high number of respondents coded as ISCED 4 may again result from the ambiguity of the response option “completed secondary school with certificate” in combination with completed vocational education and training (see above). Furthermore, in Germany, this category includes respondents who have a certificate of upper secondary general education (*Abitur* or *Fachhochschulreife*) and completed vocational training (apprenticeship or vocational school). The respective combination of generic foreign qualifications measured with the IAB-SOEP instrument was thus also coded as ISCED 4 (see Table 3). This combination of educational qualifications is not common, however, in other countries. In many, especially Eastern European countries, there are both generally and vocationally oriented secondary schools, which is reflected in the CAMCES database but not in the IAB-SOEP measure. Using the IAB-SOEP measure, respondents having completed vocational secondary schooling in such countries may report only having completed secondary schooling on the first education item, then coded as ISCED 3 general, or having completed secondary schooling on the first item and vocational schooling on the second item, then coded as ISCED 4. Each thus leads to a different coding than reporting the respective qualification directly using the CAMCES tool, where it results in ISCED 3 vocational.

The overlap for ISCED 3 general education is around a third of cases classified there using the CAMCES tool. The other cases are coded as ISCED 2, ISCED 3 vocational, or ISCED 4, and even ISCED 6-7 in the IAB-SOEP measure. ISCED 2 or 3 general could be the result of qualifications reported as “longer vocational training in a company” or “vocational school” in the IAB-SOEP measure not constituting vocational education and training at the upper secondary level in ISCED and thus in the CAMCES database. Respondents from countries where ISCED 3 is part of compulsory education, which we have assumed to refer to ISCED 2 (see Table 3), will also be miscoded as ISCED 2 in the IAB-SOEP measure. It is unclear how respondents mentioning having completed higher education in the IAB-SOEP measure could report a general upper secondary qualification in the CAMCES tool. Social desirability bias is one potential explanation, for example, when a respondent who has dropped out of university before obtaining the degree reported the degree anyway, which can occur with both the IAB-SOEP and CAMCES measures.

How can the CAMCES measure arrive at ISCED 4, while the IAB-SOEP measure detects ISCED 3 general or vocational only? ISCED 4 programs are often of a marginal character and very heterogeneous across countries, such as short programs after completion of upper secondary education, or bridging programs to enter higher education that are equivalent to general ISCED 3 programs. If the former is not regarded as vocational programs offered in the IAB-SOEP measure by respondents, respondents will only report their next lower qualification, resulting in underreporting. In the case of bridging programs, these will often be reported as completed secondary schooling, and in this case, it is their classification in ISCED that is more doubtful than the IAB-SOEP measure. Some

respondents may, however, already perceive those post-secondary qualifications as higher education as well and report them accordingly, leading to overreporting.

Moving on to tertiary education, while the CAMCES tool allows measuring and coding the relatively diverse set of qualifications classified as short-cycle tertiary education, the IAB-SOEP measure does not offer any response category relating to this level (see above). Respondents thus likely use various response options that they regard as closest, or report their next lower qualification only. In most cases, this leads to underreporting.

With regard to higher education, this is where both measures agree the most. In some cases, however, using the IAB-SOEP measure, respondents report completed secondary education only. Again, this may result from social desirability bias, here in the CAMCES instrument. However, there may also be tertiary education qualifications that are not regarded as higher education by respondents, thus leading to underreporting using the IAB-SOEP measure. For doctoral level education, the match is also rather high, but almost a third of respondents classified as ISCED 8 using the CAMCES measure did not mention completed doctoral studies in the IAB-SOEP measure.

To summarize, while a generic measurement instrument is much easier to implement in a survey of migrants than an instrument providing context-sensitive education response options relative to the country in which the respondent was educated, there is a substantial degree of ambiguity in generic response options such as “completed secondary education” or “longer vocational training in a company”, leading to substantial inconsistencies between the two measures. Of course, if both instruments arrived at the same result, there would be no reason to invest in a complex tool like CAMCES, and we think that the results reported here give credibility to the CAMCES approach. We expect the CAMCES measure to be more precise, and classification of specific foreign qualifications in ISCED to lead to more valid ISCED codes than “guessing” at the ISCED code that would best represent what respondents have in mind when reacting to the IAB-SOEP response options. However, this increased precision comes at the price of more complex preparation of the CAPI system and also takes more interview time. What we *do not* know is whether respondents find the generic or the CAMCES instruments easier to use. The CAMCES database will be further extended until at least 2019, so that we hope that the missing data issue for countries not yet covered in the database in the IAB-SOEP Migration Samples 2015 and 2016 will be resolved in the near future.⁵ The results could, of course, also be used to improve the generic IAB-SOEP measure.

6. Overview of advantages and disadvantages for data users

The results of the analyses in Section 5 and the advantages and disadvantages of the two types of measures of qualifications obtained abroad presented in Table 6 suggest that the ISCED variables based

⁵ The 2018 data collection actually implemented an extended version of the database and respondents with so far missing CAMCES measurements have been routed into the CAMCES module (again).

on the CAMCES tool should provide educational information that is closer to the truth. However, this database-derived educational variable is currently available only for a fraction of all SOEP respondents.

Table 6: Comparing advantages and disadvantages of the two alternative sources for generated ISCED values

ISCED on the basis of CAMCES		ISCED on the basis of the questions 72 and 83/84)	
Advantages	Disadvantages	Advantages	Disadvantages
Theoretically superior – asks about specific foreign degree, and respondent / interviewer do not have to do any interpretation or classification			Due to the numerous countries of origin, one cannot design questions and answers that is adequate to the wide diversity in different educational systems
Differentiated ISCED coding (3-digit) possible			Only approximated ISCED-coding at 1-digit level possible
	Up to now, only for certain subgroups of certain subsamples (see survey modalities section)	With the exception of respondents with missing items, there are valid ISCED codes for all waves and subsamples of the SOEP	
Theoretically lower cognitive demand on respondents, since they just have to remember the original term for their qualification; this should lead to lower percentage of missing data and lower selectivity in missing data	If the point at which the qualification was attained and the point of migration are in the distant past, it may be difficult for respondents to remember the exact term, especially if the qualification is not relevant in the target country (e.g., not recognized or if the respondent has not worked in Germany since then). The respondent may have become used to stating an “equivalent” German qualification. The use of the search tree interface as a fallback compensates for this.		Theoretically higher cognitive demand on respondents because the qualification attained has to be aligned to the relatively abstract answer options; this however does not seem to lead to a larger percentage of missing data (Schneider et al. 2018, p. 57), but may still lead to higher measurement error, and thus to lower validity and comparability

In the 2016 survey, 6,020 respondents stated having completed vocational or higher education abroad, and the CAMCES tool currently provides this information for 1136 individuals. This provides the basis for research questions dealing with survey methodology (e.g.: Do the diverging results on educational qualifications attained abroad from the two instruments have an influence on the analysis of the relationship between educational attainment and labor market success?) as well as for research on substantive questions about this specific subpopulation. In the future, the analytical potential will be increased when the filters are corrected, when cases are followed up on, when the number of countries in the database increases, and when the use of the CAMCES tool in the most recent refugee samples is expanded further.

7. Description of the dataset (“CAMCES”)

Variable	Description
hhnrakt	
hhnr	
persnr	
syear	Year in which information was collected
Abschl_Ausl	Qualification attained abroad (yes/no)
Anzahl_Abschl_Ausl	Number of educational qualifications attained abroad
isc97_camces	Highest official ISCED 1997 (CAMCES-Tool)
isc97a_camces	Highest alternative ISCED 1997 (CAMCES-Tool)
isc11_camces	Highest official ISCED 2011 (CAMCES-Tool)
isc11a_camces	Highest alternative ISCED 2011 (CAMCES-Tool)
country_isc97_camces	Country in which highest educational qualification was obtained
year_isc97_camces	Year in which highest educational qualification was obtained

syear

Value	Label	n
2015	Information was provided in 2015	989
2016	Information was provided in 2016	659

Abschl_Ausl

Value	Label	n (2015)	n (2016)
-1	Missing	3	-
0	No	41	22
1	Yes	945	637

Anzahl_Abschl_Ausl

Value	Label	n (2015)	n (2016)
-2	Not applicable	41	22
-1	Missing	4	-
1		482	257
2		330	255
3		55	76
4		6	14
5		-	4
6		1	2
7 ⁶		-	-
8		2	3
9		-	2
10		5	2
11		18	3
12		16	2
13		12	2
14		6	3
15		4	4
16		4	2
17		2	1
18		-	2
19		-	3
20		1	-

⁶ There is likely to be a misunderstanding regarding the reporting of more than 6 educational degrees. Instead of the number of educational qualifications, the number of years of education was given.

Value labels for isced97_camces, isced97a_camces

Value	Label	n (2015)		n (2016)	
		isced97	isced97a	isced97	isced97a
-2	Not applicable	41	41	22	22
-1	Missing	193	193	207	207 ⁷
0	No formal education, less than primary education	3	4	2	2
1	Primary education or first stage of basic education	6	7	3	3
2	Lower secondary education or second stage of basic education	65	82	38	45
3	Upper secondary education	214	239	144	159
4	Post-secondary non-tertiary education	66	69	27	28
5	First stage of tertiary education	322	341	176	186
6	First stage of tertiary education	13	13	7	7
9000	Not in the official ISCED97 mapping	66	-	33	-

⁷ These high numbers of missing data result primarily from countries of education not yet covered in the CAMCES database.

Value labels for isced11_camces, isced11a_camces

Value	Label	n (2015)		n (2016)	
		isced11	isced11a	isced11	isced11a
-2	Not applicable	41	41	22	22
-1	Missing	193	193	207	207 ⁸
0	No formal education, less than primary education	3	4	2	2
100	Primary education	6	7	3	3
244	General lower secondary completed, with direct access to upper secondary education	53	58	36	40
253	Vocational lower secondary completed, without direct access to upper secondary education	1	1	-	-
254	Vocational lower secondary completed, with direct access to upper secondary education	11	23	2	5
343	General upper secondary completed, without direct access to tertiary education	9	9	8	8
344	General upper secondary completed, with direct access to tertiary education	86	95	40	43
353	Vocational upper secondary completed, without direct access to tertiary education	51	48	35	39
354	Vocational upper secondary completed, with direct access to tertiary education	70	87	61	69
453	Vocational post-secondary, non-tertiary completed, without direct access to tertiary education	37	39	20	21
454	Vocational post-secondary, non-tertiary completed, with direct access to tertiary education	30	30	7	7
560	Short-cycle tertiary, orientation unspecified	86	90	18	21
660	Bachelor's or equivalent, orientation unspecified	46	47	49	50
760	Master's or equivalent, orientation unspecified	190	204	109	115
860	Doctor or equivalent, orientation unspecified	13	13	7	7
9000	Not in the official ISCED11 mapping	63	-	33	-

⁸ These high numbers of missing data result primarily from countries of education not yet covered in the CAMCES database.

Value labels for country_isced_camces

Value	Label	n (2015)	n (2016)
-2	Not applicable	41	22
-1	Missing	193	207
1	Bulgaria	14	34
2	Former Czechoslovakia - Slovak	-	2
3	Former Czechoslovakia - Czech	2	3
4	Czech Republic	2	5
5	Finland	-	3
6	France	9	6
7	Hungary	3	30
9	Portugal	-	17
10	Serbia	10	12
11	Slovak Republic - Slovak	1	6
12	Slovak Republic - Hungarian	-	4
13	Slovenia	2	4
14	Spain	27	20
15	Macedonia Former Yugoslav Republic of Macedonia -	3	-
17	Albanian	-	1
18	Bosnia and Herzegovina	7	2
19	Belarus	7	1
20	Croatia	11	7
21	Greece	29	20
22	Italy	40	29
23	Kazakhstan	81	7
24	Montenegro - Montenegrin (Latin alphabet)	1	1
26	Poland	105	76
27	Romania	112	79
28	Russian Federation	162	26
29	Turkey	25	11
30	Ukraine - Ukrainian	33	8
31	Ukraine - Russian	26	4
32	Former Soviet Union	21	5
33	Former Yugoslavia	5	1
34	Kosovo - Serbian	1	2
35	Kosovo - Albanian	16	4

Value labels for year_iscd_camces

Value	Label	n (2015)	n (2016)
-2	Not applicable	50	24
-1	Missing	199	210
1955		1	-
1956		1	-
1958		2	-
1959		1	-
1961		1	-
1964		2	-
1965		2	1
1966		2	-
1967		5	-
1968		8	-
1969		9	1
1970		5	-
1971		6	2
1972		8	2
1973		10	-
1974		8	2
1975		7	2
1976		8	3
1977		15	-
1978		12	2
1979		8	2
1980		13	5
1981		20	6
1982		14	5
1983		23	8
1984		18	4
1985		28	4
1986		19	6
1987		16	8
1988		26	5
1989		28	9
1990		20	6
1991		20	9
1992		19	6
1993		27	5
1994		24	9
1995		30	8
1996		26	13
1997		19	13
1998		27	8
1999		25	12
2000		31	11
2001		24	15
2002		17	13
2003		12	4
2004		17	19
2005		15	21
2006		17	22

2007	9	23
2008	18	27
2009	9	18
2010	1	28
2011	2	18
2012	3	21
2013	2	13
2014	-	4
2015	-	1
2016	-	1

B001 - B001: ext. Programm Bildungsabschlüsse**Begin block****Q001 - TEDU0: Einführungstext Bildung****Text**

Im Folgenden bitten wir Sie noch einmal genauere Angaben zu Ihren Bildungsabschlüssen zu machen. Wir benötigen diese Angaben, um den Fragebogen in Zukunft verbessern zu können.

Q002 - EDU_1: Ausl. Bildungsabschlüsse Ja/Nein**Single coded**

Haben Sie einen ausländischen Schul-, Ausbildungs- oder Hochschulabschluss? Damit sind auch betriebliche oder duale Ausbildungen gemeint.

Gemeint sind nur Abschlüsse, für die ein Zeugnis ausgestellt wurde.

Normal

- 1 Ja
- 2 Nein
- 9 Keine Angabe

Ask only if **Q002 - EDU_1,1**

Q003 - EDU_2: Anzahl Bildungsabschlüsse**Numeric****Min = 1 | Max = 99**

Wie viele Schul-, Ausbildungs- oder Hochschulabschlüsse haben Sie insgesamt im Ausland erreicht?

Gemeint sind nur Abschlüsse, für die ein Zeugnis ausgestellt wurde.

B002 - B002: Höchster ausländischer Bildungsabschluss**Begin repeater block****Repeater loop count: 10**

Scripter notes: Repeat loop count = EDU_2, but max: 10

[if Loop = 1:] In welchem Land haben Sie Ihren höchsten ausländischen Schul-, Ausbildungs- oder Hochschulabschluss erreicht? Damit sind auch betriebliche oder duale Ausbildungen gemeint.

[if Loop > 1:] In welchem Land haben Sie diesen weiteren Abschluss erreicht?

Bitte geben Sie uns die genaue Bezeichnung des Landes nach damaligem Gebietsstand an.
Wenn Sie sich unsicher sind was Ihr höchster Abschluss ist, geben Sie uns bitte das Land des zuletzt erreichten ausländischen Abschlusses an.

--> Falls dieses Land mehrere Landessprachen hat, erfragen Sie bitte die Sprache in der der Befragte den Abschluss nennen möchte.

--> Falls zusätzlich zu diesem Land eine Region angezeigt wird, erfragen Sie bitte die Region in der der Befragte den Abschluss erreicht hat.

Normal

- 1 Bulgarien
- 2 Tschechoslowakei - Slowakisch
- 3 Tschechoslowakei - Tschechisch
- 4 Tschechien
- 5 Finnland
- 6 Frankreich
- 7 Ungarn
- 8 Norwegen
- 9 Portugal
- 10 Serbien
- 11 Slowakei - Slowakisch
- 12 Slowakei - Ungarisch
- 13 Slowenien
- 14 Spanien
- 15 Mazedonien - Albanisch
- 16 Mazedonien - Mazedonisch
- 17 Albanien
- 18 Bosnien und Herzegowina
- 19 Weißrussland
- 20 Kroatien
- 21 Griechenland
- 22 Italien
- 23 Kasachstan
- 24 Montenegro - Montenegrinisch (Lateinisch)
- 25 Montenegro - Serbisch (Kyrillisch)
- 26 Polen
- 27 Rumänien
- 28 Russland
- 29 Türkei
- 30 Ukraine - Ukrainisch
- 31 Ukraine - Russisch
- 32 Sowjetunion
- 33 Jugoslawien
- 34 Kosovo - Serbisch
- 35 Kosovo - Albanisch
- 97 Anderes Land, und zwar: **Open *Position fixed *Exclusive*
- 98 Habe noch keinen Abschluss **Position fixed *Exclusive*
- 99 Keine Angabe **Position fixed *Exclusive*

Q005 - TEDU1: Einführungstext Bildung - lateinische Schrift**Text**

Bitte tragen Sie die Antwort auf die folgenden Fragen selbst in den Computer ein.
Lesen Sie die Fragen bitte aufmerksam durch und nehmen Sie sich so viel Zeit für die Beantwortung wie Sie brauchen.
Falls Sie Fragen haben, können Sie sich gerne an mich wenden.

--> Bitte drehen Sie, nachdem Sie die nächste Seite aufgerufen haben, den Laptop so, dass die/der Befragte den Bildschirm sehen kann. Zeigen Sie, falls notwendig, den „Weiter“ Button.
--> Dann drehen Sie den Laptop bitte so, dass Sie nicht mehr auf den Bildschirm sehen können. Greifen Sie bitte nur ein, falls die/der Befragte Unterstützung benötigt.
--> Bitte "OK" drücken (das externe Tool wird gestartet) und das Gerät dem Befragten übergeben.

Scripter notes: Filter: only if EDU_3 lateinische Schrift

Q006 - TEDU2: Einführungstext Bildung - nicht lateinische Schrift**Text**

Bitte wählen Sie die Antworten auf die folgenden Fragen selbst aus.
Lesen Sie die Fragen bitte aufmerksam durch und nehmen Sie sich so viel Zeit für die Beantwortung wie Sie brauchen. Falls Sie Fragen haben können Sie sich gerne an mich wenden.

--> Bitte drehen Sie, nachdem Sie die nächste Seite aufgerufen haben, den Laptop so, dass die/der Befragte den Bildschirm sehen kann. Zeigen Sie, falls notwendig, den „Weiter“ Button.
--> Dann drehen Sie den Laptop bitte so, dass Sie nicht mehr auf den Bildschirm sehen können. Greifen Sie bitte nur ein, falls die/der Befragte Unterstützung benötigt.
--> Bitte "OK" drücken (das externe Tool wird gestartet) und das Gerät dem Befragten übergeben.

Scripter notes: Filter: only if EDU_3 nicht lateinische Schrift

Q007 - BIL_4: Bildungsabschluss, Externes Tool**Single coded**

[if Loop = 1:] Was ist Ihr höchster ausländischer Schul-, Ausbildungs- oder Studienabschluss? Damit sind auch betriebliche oder duale Ausbildungen gemeint.

[if Loop > 1:] Welcher ausländische Schul-, Ausbildungs- oder Studienabschluss ist das? Damit sind auch betriebliche oder duale Ausbildungen gemeint.

[if Loop = 1:] Wenn Sie nicht wissen was Ihr höchster Abschluss ist, nennen Sie uns bitte den zuletzt erreichten Abschluss. Bitte geben Sie Ihren ausländischen Abschluss in der entsprechenden Sprach an.
[if Loop > 1:] Bitte geben Sie Ihren ausländischen Abschluss in der entsprechenden Sprache an.

Normal

99 Keine Angabe *Position fixed *Exclusive

Ask only if **Q004 - EDU_3,97**

Q008 - BIL_4AL: Abschluss anderes Land

Open

[if Loop = 1:] Was ist Ihr höchster ausländischer Schul-, Ausbildungs- oder Studienabschluss?
[if Loop > 1:] Welcher ausländischer Schul-, Ausbildungs- oder Studienabschluss ist das?

Damit sind auch betriebliche oder duale Ausbildungen gemeint.

[if Loop = 1:] Wenn Sie nicht wissen, was Ihr höchster Abschluss ist, nennen Sie uns bitte den zuletzt erreichten Abschluss.

--> Bitte geben Sie Ihren ausländischen Abschluss in der entsprechenden Sprache an.

Q009 - BIL_5: Anderer Abschluss

Open

Bitte nennen Sie den anderen ausländischen Abschluss.

Scripter notes: -1: Keine Angabe
-2: Weiß nicht

Filter: only if BIL_4 (externes Tool) == -1 \ -2 \ -3 \ -4

Q010 - BIL_6: Jahr des Abschlusses

Numeric

Min = 1900 | Max = 2015

In welchem Jahr haben Sie diesen Abschluss erreicht?

--> Wenn Sie es nicht genau sagen können, schätzen Sie bitte.

--> Bei Angabe einer Zeitspanne mittleres Jahr angeben (z.B. 1955-1959, Eingabe: 1957).

--> Bei Angabe einer Zeitspanne von zwei Jahren das letzte Jahr angeben (z.B. 1980-1981, Eingabe: 1981).

Scripter notes: [if BIL_6 - Geburtsjahr < 6:] Sind Sie sich sicher, dass Sie in diesem Jahr Ihren Abschluss gemacht haben? 1: Ja 2: Nein *Back BIL_6

Q011 - EDU_7: Weitere Bildungsabschlüsse

Single coded

Haben Sie noch einen weiteren ausländischen Schul-, Ausbildungs- oder Studienabschluss?
Damit sind auch betriebliche oder duale Ausbildungen gemeint.

Normal

- 1 Ja
- 2 Nein
- 8 Weiß nicht
- 9 Keine Angabe

Q012 - EDU_8: Weitere Bildungsabschlüsse

Single coded

Wo haben Sie diesen Abschluss erreicht? War das in ...

Normal

- 1 *Land aus EDU_3*
- 2 einem anderen Land
- 8 Weiß nicht
- 9 Keine Angabe

B002 - B002: Höchster ausländischer Bildungsabschluss

End repeater block

B001 - B001: ext. Programm Bildungsabschlüsse

End block

B: Excerpt from questionnaire

72. What type of school-leaving certificate did you attain?

- Left school without graduating.....
- Graduated from mandatory schooling with school-leaving certificate.....
- Graduated from higher-level secondary school with school-leaving certificate.....
- Question 76!

83. What kind of education or training was it? When did you complete this education or training?

Multiple answers possible!
 Please state the year even if you did not complete the training.

- | | Yes | Year |
|--|-----------------------------|----------------------|
| I received in-house training at a company..... | <input type="checkbox"/> => | <input type="text"/> |
| I completed an extended apprenticeship at a company..... | <input type="checkbox"/> => | <input type="text"/> |
| I attended a vocational school..... | <input type="checkbox"/> => | <input type="text"/> |
| I attended a university / college with a more practical orientation..... | <input type="checkbox"/> => | <input type="text"/> |
| I attended a university / college with a more theoretical orientation..... | <input type="checkbox"/> => | <input type="text"/> |
| I completed doctoral studies..... | <input type="checkbox"/> => | <input type="text"/> |
| Other..... | <input type="checkbox"/> => | <input type="text"/> |

84. Did you receive a transcript or certificate documenting the successful completion of this training or education?

- Yes.....
No..... → Question 95!

72. Mit was für einem Abschluss haben Sie die Schule beendet?

- Schule ohne Abschluss verlassen.....
- Pflichtschule mit Abschluss beendet.....
- Weiterführende Schule mit Abschluss beendet.....
- Frage 76!

83. Was für eine Ausbildung war das? In welchem Jahr haben Sie diese Ausbildung beendet?

Mehrfachnennungen möglich!
Bitte machen Sie auch eine Jahresangabe, wenn Sie die Ausbildung nicht abgeschlossen haben.

	Ja	Jahr
Ich wurde in einem Betrieb angelemt.....	<input type="checkbox"/> ⇒	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
Ich habe in einem Betrieb eine längere Ausbildung gemacht.....	<input type="checkbox"/> ⇒	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
Ich habe eine berufsbildende Schule besucht.....	<input type="checkbox"/> ⇒	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
Ich habe eine Hochschule / Universität mit eher praktischer Ausrichtung besucht	<input type="checkbox"/> ⇒	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
Ich habe eine Hochschule / Universität mit eher theoretischer Ausrichtung besucht	<input type="checkbox"/> ⇒	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
Ich habe ein Promotionsstudium absolviert.....	<input type="checkbox"/> ⇒	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
Sonstige Ausbildung.....	<input type="checkbox"/> ⇒	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>

84. Haben Sie ein Zeugnis über den erfolgreichen Abschluss dieser Ausbildung erhalten?

Ja.....
↓

Nein..... ➔ *Frage 95!*

TNS Infratest Sozialforschung (2014) Erhebungsinstrumente des IAB-SOEP -Migrationssamples 2013: Integrierter Personen-Biografiefragebogen, Haushaltsfragebogen. *SOEP Survey Papers* 218: Series A. Berlin: DIW/SOEP.

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