



Data Survey

Surveying Lifelong Learning in the German National Educational Panel Study

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Abstract

This article outlines the German National Educational Panel Study, which collects comprehensive data on lifelong learning in a multi-cohort sequence design, covering early childhood, childhood, adolescence, young adulthood and adulthood. It outlines data collection for all the cohorts and educational phases across the life course whilst focusing on the educational stage 'Adult Education and Lifelong Learning'. Data can be accessed for academic purposes as scientific use files under data contract.

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1. Introduction

The German National Educational Panel Study (NEPS) started in 2009 with the core objective of collecting and providing representative data on *complete* educational biographies and, for adult individuals, employment histories (Blossfeld, Rossbach and von Maurice, 2011; Blossfeld and Rossbach, 2019). This involves the collection of detailed longitudinal data on educational processes *across the lifespan*: from newborn infants to retirees. This new data collection was developed to deepen the understanding of educational decisions, to observe the development of specific competences over time and to describe the consequences of educational acquisition for an individual's life course in detail. In particular, the NEPS aims to fill the gap in the availability of representative, large-scale studies that observe relevant factors in the decision-making processes at *critical transitions* of the educational career. It therefore covers the lifelong acquisition of competences, starting from learning in the family, in kindergarten, in school, at college, in vocational training and during further training in the workplace and beyond. Moreover, the NEPS covers both individual and contextual factors, as it combines data collected from children, their parents, caregivers, teachers and principals, with institutional information on kindergartens, schools and colleges.

The purpose of this article is to provide education researchers, economists and social scientists with an overview of the NEPS.

Collectively, a set of individual data sets available in Australia cover the same life course, but only in a partial manner. As the article describes various cohorts of the German dataset, it includes references to analogous large-scale Australian datasets to enhance data structure understanding and accessibility of the NEPS for Australian researchers.

2. Features of the NEPS

2.1 The Nation-Wide Interdisciplinary NEPS Network

The NEPS was initiated by a large interdisciplinary network of education researchers and (almost 20) research institutions distributed all over Germany, with its centre being located at the University of Bamberg.¹ The study was funded by the German Federal Ministry of Education and Research from 2009 to 2013. Thereafter, it was institutionalised with independent funding in 2014, when the Leibniz Institute for Educational Trajectories (LifBi) in Bamberg was founded as an infrastructure facility to host the NEPS. A key element of the NEPS is still its interdisciplinary network of educational researchers from economics, educational science, psychology, sociology and survey methods, which allows the data collection to be designed under the consideration of different theories from multiple disciplines.

2.2 The NEPS Pillars

The NEPS is organised according to six thematic pillars, which coordinate the theoretical concepts and their implementation in the survey along the following dimensions: 1) competence development across the life course; 2) education processes in life-course-specific learning environments; 3) social inequality and educational decisions across the life course; 4) education acquisition of persons with a migration background; 5) returns to education across the life course background; and 6) motivational variables and personality aspects across the life course (Blossfeld and von Maurice 2019). These

dimensions are included in the collaborative survey development, ensuring that these facets are reflected in each single questionnaire from early childhood to late adulthood.

2.3 Educational Stages across the Life Span in the NEPS

The NEPS observes individuals during eight educational phases over their life course and accompanies respondents upon their transition into a subsequent educational stage. The educational stages are oriented towards the transitional phases *within* the German education system and towards the transitions *from the education system into the labour market* (Blossfeld, Rossbach and von Maurice, 2011). In each of the following educational phases data are collected annually with stage-specific instruments, either through direct personal interviews or proxy interviews of relevant context persons (e.g., parents), or both:²

- Newborns and Early Childhood Education
- From Kindergarten to Elementary School
- From Elementary School to Lower Secondary School
- From Lower to Upper Secondary School
- Upper Gymnasium Level and Transition to Higher Education, Vocational Training or the Labour Market
- From Vocational Training to the Labour Market
- From Higher Education to the Labour Market
- Adult Education and Lifelong Learning

2.4 Multi-cohort Sequence Design

The NEPS follows a multi-cohort sequence design: cohorts at different educational phases

are sampled and longitudinally surveyed. This design allows information to be collected on educational decisions, educational attainment, competence development and returns to educational investments relatively quickly for different stages over the life course (von Maurice, Blossfeld and Rossbach, 2016). To follow respondents over time, the NEPS established six starting cohorts.

3. Starting Cohorts of the NEPS

Between 2009 and 2012, the following six starting cohorts were sampled with a total of more than 60,000 individuals: newborn infants, kindergarten children, school children at grade 5, school children at grade 9, college students and adults. The samples are representative for Germany (Assmann et al. 2019). While kindergarten children, school children and college students were sampled in educational institutions, newborn infants and adult individuals were sampled based on population register data. Individuals in all starting cohorts are surveyed on an annual basis.³

3.1 Starting Cohort 1: Early Childhood

Aiming to measure education from the very beginning, the youngest sample of the NEPS consists of newborn children. About 3,500 children born between February and June 2012 and their mothers were drawn as an individual sample based on population registers (FDZ-LIfBi 2019a). The mothers were surveyed for the first time in 2012 to provide information on the characteristics and learning environments of their children aged about 7 months. Such information is usually quite scarce, especially for *large-scale* longitudinal data sets. After the first survey, subsequent interviews took place at the child's age of 15 months, 26 months and 37 months up to the sixth wave, when the children reached the age of about 5 years.

The data collection based on computer-assisted personal interviews (CAPI) included measurements of competences, parent-child interactions and activities, health status and contextual factors such as family background,

as well as video recordings of parent-child interactions (Hachul et al. 2019). In addition to the parents, external childcare persons (educators, childminders, managers of day care or kindergartens) were interviewed to provide invaluable contextual information (FDZ-LIfBi 2019a). The comprehensive information on the target children and context persons allow answering crucial research questions based on this data. For example, how do skills and abilities develop in toddlers and what influence do parents and caregiving institutions have on these childhood developments? Which factors determine the use of caregiving institutions? How do intra- and extra-familial settings interact with each other? How do skills develop throughout childhood and what returns do these skills yield?

3.2 Starting Cohort 2: Kindergarten Children

The sample of kindergarten children was drawn in 2010 from a random sample of elementary schools and a sample of kindergartens in the corresponding catchment areas to ensure that the transition from kindergarten to school could be observed. About 3,000 children whose school enrollment was scheduled for 2012 were selected from about 250 kindergartens (Skopek, Pink and Bela, 2012a). The data collection started in 2011 and was repeated after the kindergarten-to-school transitions up to Wave 7, when this cohort reached grade 5. In addition to competence tests of the children, computer-assisted telephone interviews (CATI) were conducted with their parents. To survey information on the kindergarten's learning environment, the kindergarten staff were interviewed as well. Starting Cohort 2 was extended by a refreshment sample of more than 5,000 children who entered elementary school in 2012/13 (Berendes et al. 2019).

In contrast to Starting Cohort 1, for whom competency tests were run at home, the test sessions for Starting Cohort 2 took place at the kindergartens. To better capture the target children's learning environments, their familial and institutional learning contexts,

parents, day-care educators and kindergarten principals were also surveyed (Skopek, Pink and Bela, 2012a). Therefore, the data allow investigation into the interplay between family and non-family learning contexts and the transitions from one educational institution (kindergarten) to the next (elementary school). Further, the NEPS captures the dissemination of social and ethnic disparities in kindergartens and schools, and it covers early returns to education, such as transitions to academic-track high school.

3.3 Starting Cohort 3: Children in Secondary School, Grade 5

To describe educational pathways through secondary school, school children were drawn in 2010, when they were in grade 5 (about age 11), which is immediately after the transition from elementary school to secondary school in most German federal states (Skopek, Pink and Bela, 2012b). According to the sampling frame based on all schools in Germany, 300 schools from different secondary school tracks (lower track, intermediate track and academic track), as well as comprehensive schools and schools for students with special educational needs were selected to collect information on more than 6,000 students (Fabian et al. 2019). In 2012, a refreshment sample of more than 2,000 additional students in grade 7 was drawn. Between 2010 and 2017, eight waves were conducted, a period which covered, for some students (from the lower and intermediate track), the transition to the subsequent educational stage, the transition to another school, to vocational training or to the labour market.

The data collection comprised competence tests in several domains: language, mathematics, science and meta-competences, such as ICT competence and cognitive problem-solving ability (Fabian et al. 2019). Students themselves completed a paper-and-pencil (PAPI) questionnaire, and their parents were asked about the home context via CATI interviews. Furthermore, a PAPI questionnaire for teachers and school principals collected data on the classroom and the school context,

for example on class size, the composition of the student body and school equipment available, as well as on lessons in general. Using Starting Cohort 3 data, it is possible to answer research questions such as which type of schools are chosen, why students switch to another type of school or why they repeat grades. Further, this starting cohort enables researchers to investigate the central issue of educational paths through lower secondary level and the transition to upper secondary level.

3.4 Starting Cohort 4: Children in Secondary School, Grade 9

In a similar manner, older school children in grade 9 (at about age 15) were sampled to observe educational pathways through to the end of secondary school and beyond. For this purpose, about 16,500 students from about 650 schools from different school tracks were representatively selected in 2010 (Ludwig-Mayerhofer et al. 2019). In addition to sampling regular schools, a sample of respondents from special needs schools was also drawn (Skopek, Pink and Bela, 2013). The first two interviews took place in schools towards the end of the school year 2011, and the respondents were surveyed in CATI interviews in subsequent waves to track respondents independent of when they leave school. The questionnaire captured information about students' educational and occupational decisions by asking students about their school performance, educational aspirations, socio-emotional skills, satisfaction and health. In addition, competence tests in the same domains as for Starting Cohort 3 were conducted. As with the younger cohorts, contextual information was also collected on parents, teachers and principals. Following Wave 10 in 2018, the former students of Starting Cohort 4 were successfully integrated into the adult stage.

The opportunity to follow students during the transition from secondary school to subsequent schooling, vocational training, college or the labour market makes this starting cohort particularly valuable for

research. The data enable in-depth analyses on the factors that determine (successful) transitions from school to the labour market, as well as the reasons for choosing a specific pathway. Furthermore, repeated competence tests allow for a comparison of potentially different skills development between the different paths.

3.5 Starting Cohort 5: Students in College, First Year

To capture the transition from higher education to the labour market, first-year students were randomly sampled from German colleges (FDZ-LIfBi 2018). From the winter term 2010/2011 until the most recent Wave 11, approximately 18,000 students from specific study areas provided information on their college entrance decisions, learning processes and competence developments in the college system, student dropouts, successful graduation and on their entry into the labour market. Data collection in this starting cohort consists of three components: first, an annual life course update including core concepts of the pillars via a CATI; second, a biannual online survey with specific questions about development in the higher education system; and third, competence tests, which were administered in group settings until 2014 and in individual settings afterwards to include highly mobile target individuals (Brachem et al. 2019).

A number of changes in the German higher education system during the last decade raised numerous questions for educational researchers (FDZ-LIfBi 2018). Research questions on the determinants of educational decisions and success, of dropping out of college, changing subjects or studying abroad were complemented by questions on the returns of a Bachelor's or Master's degree or how a change of college location after the Bachelor's degree affects successful entry into employment. General analyses on the interdependence of formal qualifications, social background, gender and migration status are also possible using these data.

3.6 Starting Cohort 6: Adults

The final starting cohort includes all educational activities in adulthood and hence covers lifelong learning. The starting cohort is based on the study *Working and Learning in a Changing World (ALWA)*⁴ which was integrated into the adult cohort. The Stage 8 questionnaire retrieves retrospective and current information with the aim of generating complete educational and employment histories. In 2009, Wave 1 of the adult cohort comprised about 11,500 respondents, which was augmented with a refreshment sample of about 5,000 additional individuals (Allmendinger et al. 2011). As individuals from Starting Cohort 6 were only surveyed in the final educational stage of the NEPS (Stage 8, 'Adult Education and Lifelong Learning'), Starting Cohort 6 and Stage 8 were often used interchangeably. Stage 8 is described in detail in the section below.

4. Adult Education and Lifelong Learning

Adult education not only takes place in an institutionalised environment but in many different settings. Thus, the main objective of the adult stage of NEPS (Stage 8) is to collect high-quality data on adult education and *lifelong learning*. Retrospective information on the life course are combined with prospective panel information on different aspects of education and lifelong learning.

The adult stage is based on the ALWA study, which was carried out by the German Institute for Employment Research (IAB) in 2007 and 2008 (Kleinert et al. 2011). ALWA's objective was to analyse lifelong educational processes, their determinants and consequences, in relation to the labour market. Subsequently, ALWA was integrated into the NEPS, and its first wave as NEPS adult cohort was carried out in 2009. The population of NEPS Stage 8 respondents consists of all adults of working age born between 1944 and 1986 and living in Germany irrespective of their labour force participation (FDZ-LIfBi 2019b). The survey is run as a CAPI lasting about 30 minutes in waves with additional

competency testing (of 60 minutes). In other waves, a CATI lasting about 60 minutes is conducted. In each wave, NEPS Stage 8 achieves spectacular response rates of over 85%, such that in 2019, almost 7,700 individuals responded to the questionnaire for the 11th time.

Stage 8 originally included the respondents of Starting Cohort 6 who were between 23 and 64 years old at the time of their first NEPS interview (born 1986–1944). As respondents from Starting Cohort 4 (born 1995) grew up, they were successfully integrated in the adult stage of the NEPS in 2018. Since then, they have been receiving the questionnaire for adults (with some modifications).

To cover adequately all sub-areas of the life course, the questionnaire is divided into independent longitudinal modules including schooling, vocational preparation, vocational training and higher education, military or civil service, employment history, unemployment history, partners in the household, children and parental leave. This modular design allows respondents to report on life in all its complexity (Allmendinger et al. 2019). To ensure comprehensive data quality in addition to the recording of the life course, NEPS Stage 8 draws on the six pillars with their expertise on specific topics. Potential research topics cover all aspects of lifelong learning, for example the influence of learning environments, the decision-making processes leading to learning participation of adults or school-to-work transitions and transitions in later life due to family formation or employment mobility.

4.1 Special Features of NEPS Stage 8

Some special and innovative features of NEPS Stage 8 are worth highlighting. First, comprehensive high-quality data on adult education and lifelong learning are collected, taking advantage of different survey methods to gather retrospective and current longitudinal information and drawing on theories from different fields for an interdisciplinary approach (Allmendinger et al. 2019). This detailed data on the life course, educational

and employment histories can be linked with information on geographic mobility, family formation and information on subjective well-being, health, social and cultural resources and political participation, etc. The latter data thereby not only serve as background information, but also provide information on returns to education and on the outcomes of educational investments. Second, cognitive competences, such as reading literacy, mathematics, natural sciences and computer skills, are tested at regular intervals and can be combined with information on the (subjective evaluation) of returns to education. Third, all dimensions of adult education and further training (formal, non-formal and informal learning) are collected. Fourth, information on employment activities also captures innovative task measures. Examples of job tasks are reading or writing several pages, calculating, working with cash, using a computer, problem solving or the performance of physically demanding activities. Information on job tasks helps analyse changes in the overall structure of the economy and their implications for persons and firms (Matthes et al. 2014).

4.2 Focus on Further Education

A focus of NEPS Stage 8 is lifelong learning, which in the context of adults, translates into a special emphasis on further training. Educational processes for children and youth are embedded in an institutionalised context yielding results of exams and formal educational degrees and are therefore comparatively easy to measure.

To capture all aspects of adult learning over and above formal institutions, such as in a firm or workplace, households and families (Allmendinger et al. 2019), NEPS Stage 8 collects information on different dimensions of education: formal, non-formal and informal learning.

Formal education is institutionalised learning and leads to officially recognised certificates. As these certificates strongly determine access to and success in the German labour market (Damelang, Schulz

and Vicari, 2015), the NEPS collects information on certificates and formal degrees retrospectively in the schooling and vocational training modules. Non-formal educational investments of adults include (institutionalised) shorter trainings not leading to certificates and are collected throughout different modules in the questionnaire. Learning processes organised by the respondents themselves, such as on-the-job training, reading of relevant literature or looking up content on the internet are called 'informal learning'. This is the third and most complicated form of education collected in Stage 8. Because informal learning can be short and even unintentional, the information is not trivial to collect in a survey. However, this information is an integral part of lifelong learning and can be crucial in determining future success over the life course.

4.3 Innovative Survey Design

All interviews in the NEPS adult stage are computer-assisted, which enhances data quality and allows customised interviews with large filtering possibilities (Drasch et al. 2016). A substantial part of the survey is dedicated to collecting and updating life course information. Therefore, three strategies are combined to anchor respondent activities in time (Allmendinger et al. 2019). First, interviewers have access to earlier information to help respondents remember dates accurately. Second, a special data revision module was developed to ensure data consistency and allow for data editing during the survey, thereby improving overall data quality (Ruland et al. 2016). Third, proactive dependent interviewing techniques, such as contextual preloads, are used to remind respondents of their previous answers and to collect life-course data completely and consistently (Trahms, Matthes and Ruland, 2016).

4.4 Data Linkage

To enrich the survey data with administrative information on individuals subject to social security contributions, some starting cohorts

are linked to administrative data available at the IAB. For Starting Cohort 6 (the adult cohort), the linked data are already available to the research community (Antoni et al. 2018). The NEPS and the IAB plan to link more starting cohorts successively. The linkage of Starting Cohort 6 dramatically expands the research opportunities by including detailed records on earnings, labour market participation and unemployment or participation in active labour market policy measures at the daily level. In addition, the administrative data also provide information on the characteristics of the firms where respondents work. Finally, the record linkage extends the observation period to 1975, the earliest year of administrative data availability.

The administrative and survey data were linked for the ALWA study (5,354 individuals from 6,778 possible individuals were successfully linked), for the NEPS Starting Cohort 6 Wave 1 (additional linkage of 3,416 individuals) and for the NEPS Starting Cohort 6 Wave 3 (additional linkage of 3,888 individuals). The linked dataset is called NEPS-SC6-ADIAB⁵ and is currently available for the survey years 2007/2008 through 2015/2016.

4.5 Data Access and Dissemination

The data for all starting cohorts are available to the research community. After data collection, the data are subject to strict quality and data protection control and are disseminated to the research community as Scientific-Use-Files (SUF) from the Research Data Centre⁶ in Bamberg, Germany. The SUFs are updated at regular intervals and documented in both English and German. Three access modes are offered according to the degree of anonymisation: downloadable data, remotely accessible data and onsite-use-only data. Data access is free of charge, but users are required to sign a Data Use Agreement with the Leibniz Institute for Educational Trajectories, as well as comply with further

requirements, depending on the access mode.⁷

5. Summary

The German NEPS was created to collect longitudinal data over the life course from newborns to retirees on education and *lifelong learning* in Germany. Compared to most other datasets available internationally, this *incredibly rich* data allow researchers to fill informational gaps on educational processes, competency development, educational decisions and returns to education in formal, non-formal and informal learning contexts. The research community can access the data via the Research Data Centre of the LIfBi and the dataset is nationally and internationally renowned as one of the *world's leading datasets on education*. All six starting cohorts have successfully been established between 2009 and 2012 and provide valuable data for numerous follow-up waves. The data collected fill an important data gap and in turn serve as a crucial evidence base for education research and policy advice, not just in Germany but in Australia and worldwide.

Endnotes

1. For a detailed overview of the evolution of the NEPS from 2006 until recently, see von Maurice, Blossfeld and Rossbach (2016)

2. For the relevant Australian datasets covering similar life course time periods, see Educational Phase 1) The Longitudinal Survey of Australian Children (LSAC): With Focus on Baby Cohort B; Educational Phases 2–4) The Longitudinal Survey of Australian Children (LSAC): With Focus on Child Cohort K; Educational Phases 5–7) Longitudinal Surveys of Australian Youth (LSAY), The Household, Income and Labour Dynamics in Australia Survey (HILDA); Educational Phase 8) The Household, Income and Labour Dynamics in Australia Survey (HILDA). With respect to data documentation of Australian datasets, please see: for the LSAC, AIFS (2018) and <<https://growingupinaustralia.gov.au/>>; for the LSAY, Parvazian and Semo (2018) and <<https://www.lsay.edu.au/data>>; for the HILDA, DSS and MIAESR (2017), Wilkins and Lass (2018) and <<https://melbourneinstitute.unimelb.edu.au/hilda>>.

3. While some information is collected in each wave, other data collections such as competence tests take place at fixed intervals (e.g., every 4 years).

4. For more information on ALWA and on access to the ALWA data, please see <https://fdz.iab.de/en/FDZ_Individual_Data/ALWA.aspx>.

5. For information on data access, see <https://fdz.iab.de/en/FDZ_Individual_Data/NEPS-SC6-ADIAB/IAB_NEPS-SC6-ADIAB7515.aspx>.

6. Research Data Centre of the Leibniz Institute for Educational Trajectories: <<https://www.neps-data.de/en-us/datacenter.aspx>>.

7. For further information, see <<https://www.neps-data.de/en-us/datacenter/dataaccess.aspx>>.

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