



# NEPS Working Papers

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The National Educational Panel Study:  
A long term assessment of competence  
development and educational careers

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**The National Educational Panel Study:  
A long-term assessment of competence development and  
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# **The National Educational Panel Study:**

## **A long-term assessment of competence development and educational careers**

### **Abstract**

The National Educational Panel Study (NEPS) has been set up to find out more about how education is acquired, to see how it impacts on individual biographies, and to describe and analyse the major educational processes and trajectories across the lifespan. We are collecting longitudinal data on the development of competencies, learning environments, the effects of social inequality and migration, and returns to education throughout the lifespan. The goal is to provide a rich source of potential analyses for the various disciplines concerned with educational and training processes, and to set up a basis for major improvements in educational reporting and the provision of expert advice for policymakers in Germany. All NEPS data will be made available to the national and international scientific community. To ensure high-quality user support, we are investing in modern methods of data documentation and data dissemination. This paper gives a general overview of the NEPS project, focusing on how our data will help us to better understand the German educational system. As the success of the project depends on the data usage, the paper also sketches our plans for developing high-quality user services.

## 1. Project overview

In modern knowledge societies, education is the decisive precondition for not only participation in democracy but also economic growth and prosperity. Increasingly rapid changes in a globalized world are making it necessary to cope with new challenges in both private and working life. The National Educational Panel Study (NEPS) is currently being set up to face these challenges by finding out more about the acquisition of education in Germany, plotting the consequences of education for individual biographies and describing as well as analysing central education processes and trajectories across the entire lifespan. The interdisciplinary NEPS consortium combines the specific expertise of a number of research institutes, researcher groups and research personalities under the management of Professor Hans-Peter Blossfeld at the Otto-Friedrich University of Bamberg, Germany. The project has been evaluated scientifically by the German Research Foundation, and is receiving both federal and state government support. It is being financed by the German Federal Ministry for Education and Research.

The NEPS distinguishes eight stages of education that are integrated and coordinated through a theoretical on five interlinked dimensions. These dimensions are: (1) competence development in the life course, (2) education processes in learning environments, (3) social inequality and education decisions in the life course, (4) education acquisition with migration background in the life course and (5) returns to education in the life course. While these five dimensions form the main structure of the NEPS, their content will be examined throughout the lifespan with a particular focus on the following eight stages of education: (1) from birth to early childcare; (2) from kindergarten to elementary school; (3) from elementary school to lower secondary school; (4) from lower to upper secondary school or vocational training; (5) from upper secondary school to higher education, vocational training or the labour market; (6) from the vocational education and training system to working life; (7) from higher education to the labour market; and (8) adult education and lifelong learning. These theoretical dimensions and educational stages form the framing concept for the NEPS. In addition, there are method groups dealing with central questions like sampling, non-response and mode effects.

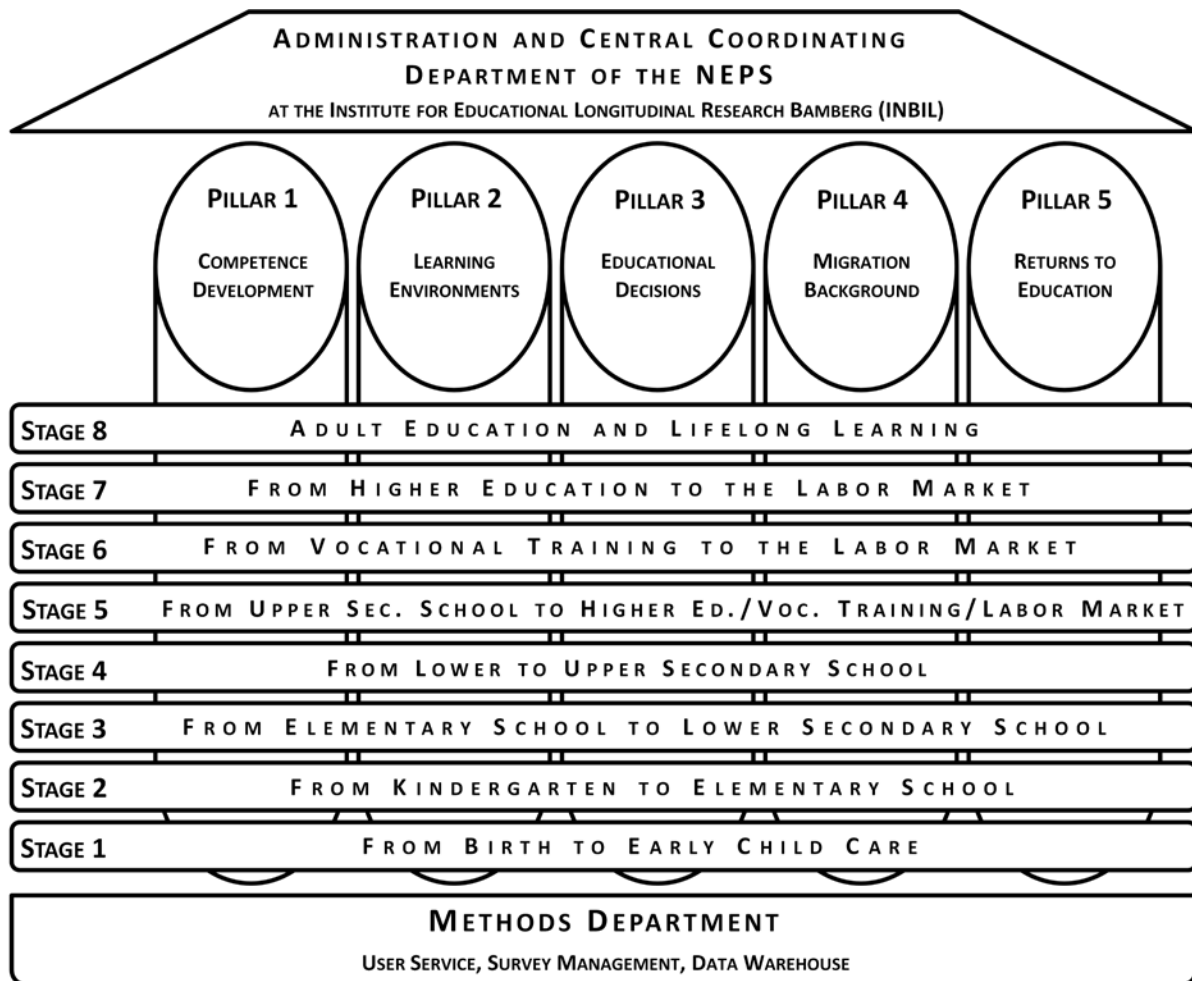


Figure 1: The framing concept of the National Educational Panel Study

Methodologically, the NEPS is based on a multicohort sequence design. Six starting cohorts – newborns, Kindergarten children, 5th graders, 9th graders, first-year university undergraduates and adults – are being recruited between 2009 and 2012. These will contain a total of more than 60,000 participants who will be surveyed regularly over an extended period of time. Their competencies will also be assessed at set intervals. To document and analyse historical changes in the way people pass various transitions into, within and out of the education system, new starting cohorts will also be recruited and integrated into the study in later years (creating a succession of cohorts). The data collected for the NEPS will be subjected to prompt and strict quality controls before being processed and documented in a user-friendly way. While complying strictly with personal data privacy requirements, this will grant researchers in Germany and abroad the opportunity to analyse the data as exhaustively as possible, thereby contributing to the greatest possible progress in education research.

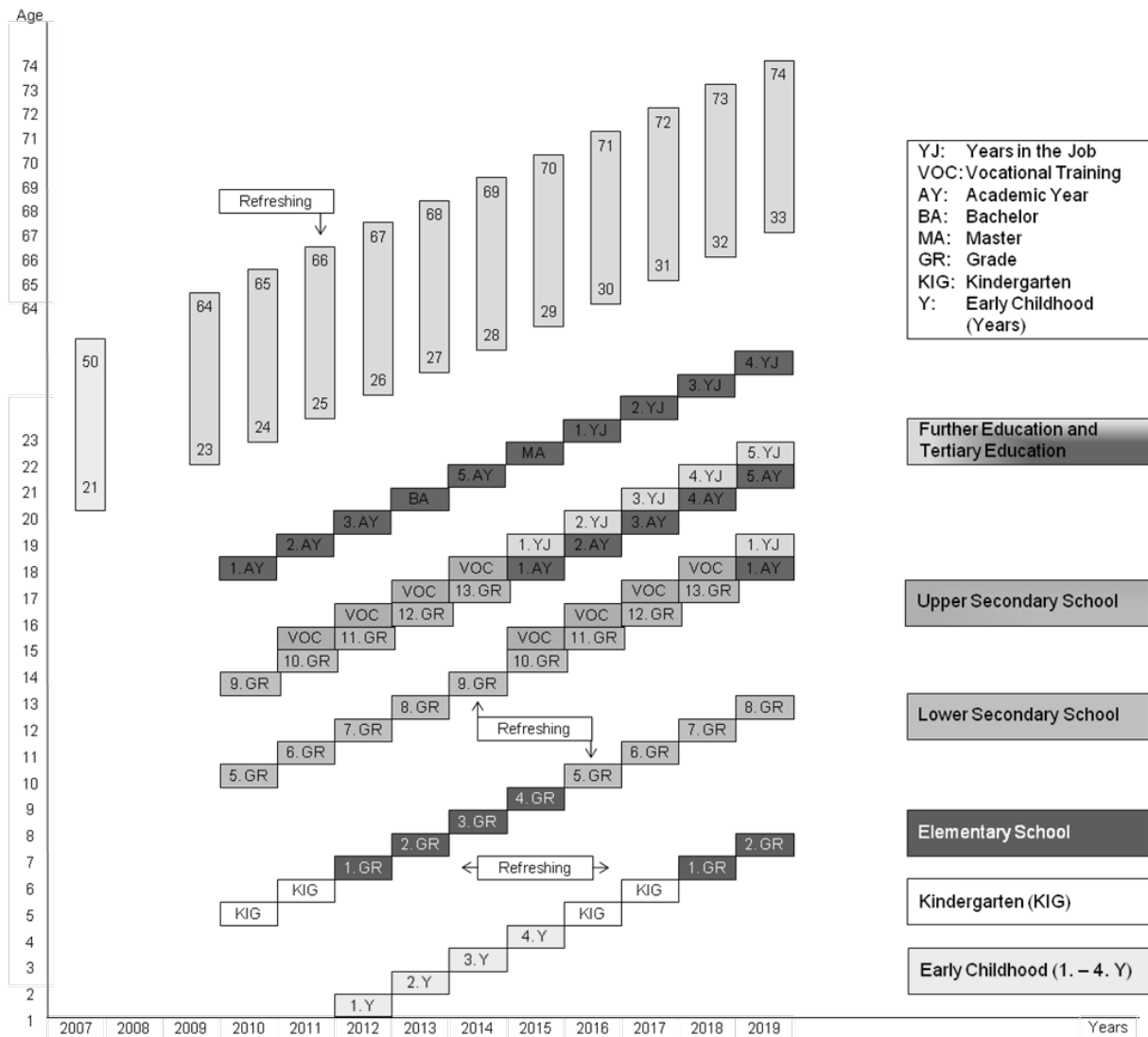


Figure 2: The multicohort sequence design

The NEPS will deliver innovative impulses for basic research on developmental processes and trajectories. In the mid- to long-term, the NEPS concept will help answer numerous questions including:

- How do competencies develop over the life course?
- How do competencies influence decision-making processes at various critical transitions in educational careers (and vice versa)?
- How and to what extent are competencies influenced by opportunities to learn in the family, the peer group and the following learning environments: Kindergarten, school, higher education, vocational training and further education?
- Which competencies are decisive for obtaining educational qualifications, which for lifelong learning, and which for a successful personal and social life?
- How do political reforms influence the acquisition of competencies or equal opportunity in the education system?

In sum, the NEPS is expected to decisively improve the framing conditions for empirical education research in Germany, provide an empirical basis for advising policymakers, make a major contribution to promoting the careers of young scientists, and lead to a marked improvement in the international standing of German education research.

## **2. The NEPS Data**

The survey design of the NEPS will provide an abundance of research opportunities. However, this abundance is accompanied by enormously complex data structures: Eight stages and five pillars are developing instruments for different study units. In the schooling stages, data will be collected from the target persons, their parents, teachers and heads of schools. All questionnaires and competence tests together result in a database with numerous dependencies between the different types of data. These dependencies are both content-specific and time-specific, because the NEPS will soon be providing a longitudinal database. The surveys will be carried out in settings of immense institutional and individual diversity. As a result, instruments need to vary both between and within educational stages in order to effectively record the manifold educational pathways of the study population. Each unit under study requires a specially adapted instrument in each year of the survey. Conversely, all variation and diversity must be embedded within an integrated panel database that will allow researchers to analyse all types of data together. At the individual level, the target persons will be the main units of such data merging. As all data can be traced back to these units, it can be combined for microlevel analyses. This includes all contextual information and the mapping of a multilevel structure (children in school, schools in counties, etc.). However, the database must also comply with research interests in, for example, mode effect studies, data fusion and attrition analyses. Accordingly, the NEPS database will carry numerous identifiers to cover all possible data combination and segmentation options.

In sum, the NEPS surveys will deliver a very complex longitudinal database. Yet, this database must provide convenient access for all researchers interested in working with the data, and not be confined to a small group of experienced users. Users with different backgrounds and from different disciplines (such as sociology, educational science, psychology or economics) must be accommodated to ensure not only equal research opportunities but also high-quality analyses. The challenge of reconciling a complex survey design with convenient data usage calls for extensive user support. Unlike many previous studies, the NEPS project is investing in high-quality user services including on-site researcher training; thorough documentation; easy-to-use tools for searching, retrieving and preparing the data; and modern means of data access.

## **3. User Services**

### ***Training Courses***

The NEPS Data Center is prepared to provide all kinds of support to users for an effective and unconstrained access to the NEPS data. One core feature of the support concept is to establish a community of well-trained and trusted users. Researchers will be invited to participate in training courses addressing different aspects of the NEPS. The training modules will provide an introduction to the study design and data structures to ensure a solid level of background knowledge that will help new users start their research projects.



This includes topics such as how to work with a specific type of data, how to merge effectively, how to weight correctly and so on. The courses will also train researchers in all technical aspects of using the data enclave *RemoteNEPS* (see below). Last but not least, the training modules are aimed at instilling a “culture of confidentiality” among data users and to inform about relevant aspects of data protection.

### ***Metadata Services***

Complex data structures create countless pitfalls. Many potential users may be discouraged and findings can easily be lost through data discovery problems, misinterpretations or technical mistakes in data preparation and analysis. The key issue for the user services is to provide sufficient, easy to obtain and clearly arranged information. Before starting any data analysis, users must be able to find the appropriate data for their research questions and understand this data. Both finding and understanding the data require metadata, that is, 'data about data'. As study designs become increasingly complex, metadata services become even more important and challenging to implement. Prospective and ongoing research require metadata that can be explored interactively and will provide information on every aspect of the surveys and their data. Thus, a thorough documentation (in German and English) will be supported by a metadata portal offering a rich set of online data discovery tools and web-services. The NEPS will set up a metadata portal as soon as data becomes available for external users.

### ***Three Modes of Data Access***

The NEPS will offer three modes of data access designed to support the full range of users' interests and maximize data utility while complying with strict standards of confidentiality protection. Combining well-known approaches with highly innovative means of data access, the NEPS will set new standards of user support and promote good scientific practice in Germany.

The NEPS research data will be distributed via:

- traditional Scientific Use Files that can be downloaded from the NEPS website,
- modern remote access technology (*RemoteNEPS*), and
- on-site access.

All three modes of data access require that a contractual agreement has been signed. This agreement involves arrangements at the researcher's home institution and confidentiality pledges. Specifically, the documents include (a) the proof of an affiliation to a scientific institution; (b) a specification of the purpose, duration, and termination of data usage as well as the project staff involved; and (c) the commitment to compliance with the rules of data protection, in particular to refrain from any attempt to re-identify individuals and individual institutions, to merge the NEPS data with data from other sources without permission, and to use the data for purposes other than the announced project.

*Traditional Scientific Use Files* are restricted versions of the survey data. The NEPS generates these files using anonymization techniques based on information reduction such as recoding or removing of critical variables to protect privacy and to minimize the risk of disclosure. These Scientific Use Files will be available from the NEPS web portal via a secure connection.

The NEPS Data Center will also offer data via a *modern remote access technology*. The development of the data enclave RemoteNEPS represents pioneering work as the NEPS will be the first large-scale provider of a remote access solution in Germany. RemoteNEPS will offer a “virtual desktop” in a controlled environment that allows accessing more sensitive microdata remotely. The online resources of the enclave are easily accessible. No software has to be installed and users can work on any operating system. The only requirement is access to the Internet: An encrypted connection with RemoteNEPS provides the gateway to the data. After registration, authorized researchers access the enclave using an innovative and highly secure biometrical authentication system (keystroke biometrics, certified by TÜV). Data is only available for online analysis and will not be transmitted to the user’s system. After data analysis is complete, researchers can request the delivery of output. The NEPS staff reviews the output requests for confidentiality and uses strict controls to ensure the integrity of the output as well as its correct and timely delivery to the researcher. In order to provide a powerful remote access service the NEPS has invested into adequate hardware and software capacities.

RemoteNEPS will offer a number of significant advantages for data users:

- Researcher’s private workspaces are equipped with a best practice infrastructure designed to optimize the workflow of data analysis, including template folders that are arranged efficiently and a version control system that accurately tracks the history of analytic scripts. As a result, the enclave provides an excellent environment for high-quality data use and greatly improves the generalizability and replicability of social research.
- All users have immediate access to the latest data releases including all updates, editions and extensions.
- Online access to various statistical data processing packages such as Stata, SPSS, Mplus, or R. Researchers can utilize all programs in the enclave without having to install them on their own computers.
- As most of the quantitative research in the social sciences is a collaborative activity, team workspaces within the enclave allow the collaborative annotation of analyses, the sharing of results and even the development of publications such as journal articles.
- Community tools encourage researchers to share their knowledge and experience. In turn, this will help the NEPS as a data producer to improve user support, maintain the data, and update tools.
- As most researchers are not yet familiar with remote access, the use of RemoteNEPS will be introduced by comprehensive tutorials. In addition, a live help system enables the NEPS staff to support the users interactively within the enclave environment.

The analysis of very sensitive information is only provided on-site in Bamberg where these data are available within a controlled physical environment (*on-site access*). The secure site prevents any copying or removing of sensitive data from the premises of the NEPS. All input and output devices are locked down and the computers are not connected to the internet or any other local area network. The staff of the NEPS Data Center is allowed to monitor all work with the data at all times. Any access to printers is controlled, and outputs are

reviewed before they can be taken away. In this controlled environment, data are highly secure and researchers can access a wide range of information, including sensitive items.

In sum, the combination of these different ways of data access will maximize the flexibility of data access for NEPS data users while complying with strict standards of protecting sensitive data. These new ideas designed to provide high-quality educational data for the scientific community will hopefully help to set new standards of scientific user support, create synergies for future projects, and thus be of lasting benefit for the scientific community.

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