The National Educational Panel Study
Need, Main Features, and Research Potential
In modern knowledge societies, education is not only the key to economic growth and prosperity but also decisive for coping with the challenges of a rapidly changing globalized world. However, the international student assessment study PISA initiated by the OECD has shown that major proportions of Germany’s school student population are insufficiently prepared to meet these challenges. Further analyses of the PISA data in Germany have also repeatedly confirmed a strong correlation between social origins and acquiring an education. Despite all educational reforms, equal opportunity still seems to be a distant goal, even though the importance of education has tended to increase rather than decline in recent decades – not only for positioning on the labor market but also for chances in the private sphere such as seeking a partner.

The National Educational Panel Study (NEPS) has been set up to find out more about the acquisition of education in Germany, to plot the consequences of education for individual biographies, and to describe central educational processes and trajectories across the entire life span. The guiding principle of the NEPS is to ask how competencies unfold over the life course, how they influence (or do not influence) educational careers at various critical transitions, and how and to what extent competencies are influenced in turn by learning opportunities – not only those within the family and the peer group but also those resulting from the way teaching and learning processes are shaped in Kindergarten, school, higher education, vocational training, and adult
education. The NEPS should also ascertain which competencies are decisive for gaining educational qualifications, which for lifelong learning, and which for a successful personal and social life. Such an approach has to examine competence development not only in Kindergarten or the general school system but also in vocational training, higher education, and after leaving the education system. To achieve this goal, Germany’s Federal Ministry of Education and Research initiated a consortium under the management of Prof. Dr. Dr. h.c. Hans-Peter Blossfeld and assigned it the task of organizing such a longitudinal study under the name of the National Educational Panel Study. Prof. Dr. Dr. h.c. Hans-Peter Blossfeld had been running the project until the end of July 2012. When he transferred to the European University Institute in Florence as of September 1, 2012, Prof. Dr. Hans-Günther Roßbach took over project management of NEPS on August 1, 2012. He had already been involved in a leading position in several NEPS departments since the project was launched.

Such a diachronic (longitudinally organized) investigation of central issues in educational research can succeed only if it integrates theoretical and methodological approaches from a range of different disciplines (cultural studies, demography, developmental psychology, diagnostics, economics of education, educational psychology, educational science, employment research, family research, gender studies, migration studies, poverty research, research on childhood and adolescence, sociology of education, survey methods, and test theory). Such an interdisciplinary con-
sortium of research institutes, researcher groups, and research personalities has been assembled in Bamberg. In addition, the competencies and experiences with longitudinal research available at numerous other locations have been networked to form a cluster of excellence (see Figure 1).

Figure 1: Geographical distribution of institutes and universities participating in NEPS
Because of their highly relevant experience in these domains, the Panel is maintaining particularly strong links to the following institutes: the Bundesinstitut für Berufsbildung (Federal Institute for Vocational Education and Training, BIBB) in Bonn, the Deutsche Institut für Internationale Pädagogische Forschung (German Institute for International Educational Research, DIPF) in Frankfurt, the Deutsche Jugendinstitut (German Youth Institute, DJI) in Munich, the Europäisches Institut für Migrationsstudien (European forum for migration studies, efms) in Bamberg, the Hochschul-Informations-System (Higher Education Information System, HIS) in Hanover, the Institut für Arbeitsmarkt- und Berufsforschung (Institute for Employment Research, IAB) in Nuremberg, the Staatsinstitut für Familienforschung (State Institute for Family Research, ifb) in Bamberg, the Institut für Wirtschaftsforschung (Institute for Economic Research, ifo) in Munich, the Staatsinstitut für Frühpädagogik (State Institute of Early Childhood Research, IFP) in Munich, the Institut für Schulentwicklungsforschung (Institute for School Development Research, IFS) in Dortmund, the Leibniz Institut für die Pädagogik der Naturwissenschaften und Mathematik (Leibniz Institute for Science and Mathematics Education, IPN) in Kiel, the Institut für Qualitätsentwicklung im Bildungswesen (Institute for Quality Development in the Education System, IQB) in Berlin, the Max-Planck-Institut für Bildungsforschung (Max Planck Institute for Human Development, MPIfB) in Berlin, the Wissenschaftszentrum für Sozialforschung (Social Science Research Center, WZB) in Berlin, and the Zentrum für Europäische Wirtschaftsforschung
(Center for European Economic Research, ZEW) in Mannheim. Leading scientists holding chairs at the following universities are also active contributors to the consortium: Bamberg, Berlin (Freie Universität and Humboldt-Universität), Bochum (Ruhr-Universität), Erlangen-Nuremberg, Giessen, Göttingen, Hamburg (Universität and Hochschule für Angewandte Wissenschaft), Hanover, Kassel, Leipzig, Mannheim, Munich (Ludwig-Maximilians-Universität and Technische Universität), Potsdam, Siegen, and Tübingen.

The consortium met together and formulated a research proposal for the NEPS. In the summer of 2008, the Deutsche Forschungsgemeinschaft (German Research Foundation, DFG) evaluated this proposal positively and emphatically recommended funding. The NEPS is located in the Institut für Bildungswissenschaftliche Längsschnittforschung (Institute for Longitudinal Educational Research, INBIL) at the University of Bamberg.
Educational institutions need to impart not only knowledge, skills, and competencies to young people but also attitudes, values, and norms. At the same time, the education system assesses student performance, documenting it in grades, certificates, and degrees. These assessments may well determine potential access to specific educational tracks such as the transition to a Gymnasium (upper secondary school) or admission to a university, and they are also very important for job placement in many sectors of the labor market. In this way, schools and training institutes contribute to increasing or decreasing an individual's chances in later life.

For members of modern information and service economies, however, learning does not come to an end when they leave the general and vocational education system. They are obliged to acquire new knowledge and new competencies continuously throughout their lives. The technological and organizational transformation of the economy is not just increasingly reducing the need for workers who perform routine activities. It is also leading to a rapid growth in jobs in the service sector and in highly qualified positions requiring complex social and communicative competencies. This upgrading of the job structure raises the demand for highly qualified people and enhances the value of education and training both on the labor market and in society.

In addition, globalization is leading to a strong acceleration of social and economic change in modern societies, and it is
requiring increasingly more flexibility and adaptability in careers and in society. The ability to acquire new knowledge and to take on new tasks has become an important precondition for both finding new jobs and acting as responsible citizens. This makes it necessary to ask how the education and training processes in childhood and adolescence relate to such an ability and willingness to acquire new competencies over the life course. How do learning processes need to be designed so that they will encourage and enable children, adolescents, and adults to carry on educating themselves throughout their lives?

Germany is also going through fundamental demographic changes. These include a declining birth rate and a drop in the number of students, an aging population due to higher life expectancy, and a growing proportion of people with a migration background. Such demographic changes create new challenges for the education system and the organization of education across the life span.
Since the year 2000, the Program for International Student Assessment (PISA) has been regularly assessing adolescent competencies in key domains at the end of ninth grade (age 15). These surveys have delivered very important findings on the distribution of competencies among school students not only within the Federal Republic of Germany but also in comparison with other nations. However, one single survey—just like one single snapshot with a camera—delivers a detailed picture of the situation at only one specific point in time. Because PISA studies always test and survey different people at a certain age or at a certain stage in the education system at 3-year intervals, they deliver trends or time-series data. By comparing specific data such as the position of German ninth-grade students in international rankings or the proportion of at-risk students across different years, changes over the course of time can be plotted—a bit like looking at a collection of class graduation photographs over successive years. However, such repeated cross-sectional studies cannot explain how individual educational processes have developed or will develop. They cannot tell us, for example, why Germany reveals a stronger relation between social origins and competencies toward the end of compulsory education than other countries, or how significant the competencies assessed in PISA actually are for the further acquisition of education and for occupational careers.

The international Progress in Reading Literacy Study (PIRLS, known in Germany as IGLU) has shown that correlations between the parents' social status and their child's reading ability

- The National Educational Panel Study is surveying and/or testing the same people repeatedly.
- With this information, educational processes and competence development can be examined from infancy to retirement age.
are comparatively low in Germany. Education scientists have used this discrepancy between the results of PISA and PIRLS to single out the very early institutional streaming of school students into different types of secondary school in Germany as one reason for the high correlation between social origins and the competence levels attained at a later age.

Studying this adequately requires better data, namely, panel data. In a panel, the same people are subjected repeatedly to multiple surveys or tests. As in a personal photo album or—if assessments are performed frequently—as in a moving picture, individual changes can be plotted across time. The quality of information in this type of data is much higher: first, because one can study not only states but also changes; and, second, because the explanatory variables and the variables to be explained are linked in time. Cross-sectional studies can only ascertain, for example, whether there is a positive relation between positive attitudes toward learning and academic achievement, but not whether academic achievement influences attitudes toward learning or whether positive attitudes toward learning influence academic achievement. In contrast, panel data offer the major advantage of being able to trace back changes in academic achievement to preceding changes in attitudes toward learning and vice versa. In addition, only real panel data can answer the question whether the tracked school system reinforces relations between social origins and competencies. Such data can be used to examine differential increases in competence as a function of prior history,
the type of school attended, and further relevant environmental variables such as the different levels of achievement given in a specific school class.

Panel data are also indispensable when it comes to studying how far educational institutions actually do impart the specific knowledge and competencies that school students, apprentices, and higher education students will need to succeed on the competitive national and international labor market. Against the background of the continuous decline in unqualified jobs on the labor market, it is also necessary to examine why far too many school leavers have no general education or occupational qualifications, and to work out how educational processes in secondary and vocational education need to be organized to match trends in the employment system. In this field, however, scientific interest in measuring features that change over time conflicts with the need to avoid placing the sort of strain on participants that leads to temporary or permanent study dropout. In large-scale panel studies like the German Socio-Economic Panel (SOEP) or the British Household Panel Study (BHPS), experience has shown that participants are best assessed at one-year intervals. Shorter, 6-month follow-ups are to be recommended in single sections of the educational career such as the extremely decisive phase of transition from general school education to vocational training.
Framing Concept of the National Educational Panel Study

The NEPS has been set up to describe and analyze the long-term development of educational careers. Its central theoretical foundations are the research paradigms and findings from sociological life-course research and life-span psychology. These are used to explain and understand the cumulative processes in educational careers by which later states are an outcome of a multiplicity of prior decisions and exploited or neglected learning opportunities.

In addition, the NEPS distinguishes eight stages of education that are integrated theoretically by concentrating on five interlinked dimensions. These dimensions (called "pillars" in the following) are Competence Development Across the Life Course; Education Processes in Life-Course-Specific Learning Environments; Social Inequality and Educational Decisions Across the Life Course; Education Acquisition of Persons with Migration Background; and Returns to Education Over the Life Course. These five pillars form the central framework of the NEPS.

Pillar 1: Competence Development Across the Life Course

The task of the pillar addressing competence development across the life course is to formulate structural models that can be used to build up a consistent and coherent picture of which competencies are relevant to education, how strong they are, and how they are acquired throughout life. It focuses on assessing and analyzing the development of both subject-specific and general competencies. The NEPS will perform longitudinal measurements of reading competence, listening comprehension, mathematical
competence, and scientific literacy, as well as self-regulation, and social competencies. A major task in this pillar is to develop test instruments that can be used to measure the above-mentioned competence domains throughout life. Another important task is to develop computer- and Internet-based competence diagnosis instruments to optimize the efficiency of longitudinally testing representative samples in the NEPS. Efficiency here refers to not only cost- and time-saving aspects but also the possibility of estimating parameters more precisely with the help of technology-based adaptive tests.

**Pillar 2: Education Processes in Life-Course-Specific Learning Environments**

The emphasis on educational processes and competence development during the life course demands a perspective encompassing both the processes occurring within one learning environment and the diachronic (longitudinal) and synchronic (simultaneous) transitions between various learning environments.

The pillar on educational processes in learning environments concentrates on the theoretical foundations and empirical methods for assessing features of the learning opportunities in relevant learning environments that may impact on the acquisition of competence and on educational processes. Drawing on the work of Fend, learning environments are conceived as providers of learning opportunities that can be used to acquire abilities and competencies. The NEPS divides these learning environments...
into three domains: formal (e.g., school, vocational training center, university), nonformal (e.g., services provided by child and youth services, associations, religious groups), and informal (e.g., family, peers, the media).

Pillar 3: Social Inequality and Educational Decisions Across the Life Course

The pillar on social inequality and educational decisions across the life course focuses on the extent of and the reasons for the variations in educational decisions across different sociostructural groups. These decisions include the choice of elementary school, the choice of secondary school, career choice, study choice, opting to continue academic training, or deciding to participate in occupational further training. Class-specific differences in educational decisions can still be observed even when achievements (e.g., grades, competencies, certificates) are comparable. This makes it necessary to clarify the significance of class-specific educational aspirations, motivations, expectations of success, and assessments of costs. A further focus should be on the gender-specific genesis of the choice of subjects during educational careers (choice of vocational training or study subject).

Pillar 4: Education Acquisition of Persons with Migration Background

In addition to these mechanisms of social inequality, both competence acquisition and educational decisions are also influenced by the particular characteristics and contexts associated with
an ethnic background or a migration biography (particularly the language spoken in the family, relations to the country of origin, integration in ethnic communities and networks, religious orientation). This is why the NEPS has a separate pillar on education acquisition of persons with migration background in the life course. It is concentrating on assessing migration-specific characteristics that are relevant to education. One special focus is on testing the knowledge and competencies of school students in the language of their parents' country of origin, because characteristics of first- and second-language acquisition provide a promising approach for explaining success in education and on the labor market.

Pillar 5: Returns to Education Over the Life Course
The fifth pillar addresses returns to education over the life course. The NEPS does not just conceive returns to education in terms of qualification-specific salaries and labor-market opportunities. Returns to education in a broader sense include political participation, active involvement in society, physical and mental health, opportunities for seeking a partner and starting a family, and subjective well-being. Some of these returns, such as physical and mental health or a student's active involvement in society, can be assessed long before entering the labor market. As a result, these can also be documented and analyzed in terms of their life-course-related development.

These five theoretical pillars can be combined with the phases and transitions in the education system to form a
two-dimensional matrix. As Figure 2 shows, the NEPS separates educational careers into the following eight stages: Stage 1: From Birth to Early Child Care; Stage 2: From Kindergarten to Elementary School; Stage 3: From Elementary School to Lower Secondary School; Stage 4: From Lower to Upper Secondary School; Stage 5: From Upper Secondary School to Higher Education, Vocational Training, or the Labor Market; Stage 6: From Vocational Training to the Labor Market; Stage 7: From Higher Education to the Labor Market; and Stage 8: Adult Education and Lifelong Learning.

Figure 2: The framing concept of the NEPS
As mentioned before, the "pillars" ensure the theoretical and methodological integration of the single stages into a life-course- or educational-career-related total concept. The advantage is that studies of single sections and transitions in the education system, such as school admission or the transition to the labor market, are not carried out separately and in isolation. The general framing concept links them together longitudinally.
Based on the theoretical priorities set by the "pillars," the NEPS is designed to contribute to finding mid- and long-term answers to numerous questions. These include the following:

- What are the decisive determinants for the acquisition of competencies and educational decisions in the single educational stages?

- What role do educational institutions, nonformal learning environments, and informal learning environments (e.g., family, peers, youth services, cultural provisions, new media) play in the acquisition of competencies and in educational decisions?

- How does competence acquisition relate to lifeworld and economic framing conditions (e.g., socioeconomic living conditions, regional contexts, migration background, gender-specific characteristics, and cultural traditions)?

- How does the use of learning opportunities in formal, nonformal, and informal learning environments relate to cognitive, social, and occupational competence development over the life course both across and beyond institutional borders and age brackets?

- How do acquired knowledge, trained skills, and competencies relate to acquired educational certificates?
• Which competencies are particularly crucial for success in vocational training and on the labor market? Are the reading, mathematical, and problem-solving competencies assessed in international academic achievement studies really those specific competencies that broadly determine the success of vocational training and work careers? Once competencies have been acquired, how far and how quickly do they become lost again once general school education has been left behind?

• Are there non-subject-specific "metacompetencies" such as learning strategies, self-regulation strategies, and motivational factors that are particularly important for a successful career on the labor market?

• What are the economic, social, and health-related returns to educational processes or acquired competencies?

• How far do older people continue their education? What are the opportunities and barriers to adult education and learning processes in later working years?
Methodologically, the NEPS is based on a multicohort sequence design (see Figure 3).

Figure 3: The multicohort sequence design

To obtain relevant data as quickly as possible, four starting cohorts have been recruited in the fall of 2010. These contain persons at a specific stage in the education system or in a specific age group. Sample selection is oriented toward transitions both within the education system and between the education system and the labor market. The major transitions are those to elementary school, to the tracked secondary school system, to
vocational training or higher education, and to the labor market for graduates of both vocational training and higher education. An exception is the fifth starting cohort recruited to study adult education. Irrespective of current participation in education or the labor market, this representative sample of 23- to 64-year-olds has already been surveyed in 2009. Starting cohort 1 documents and analyzes early childhood development and the entry to early child-care institutes (day nursery, Kindergarten, etc.). The first major assessments in this cohort commenced in 2012. To summarize, the first phase of funding up to 2013 will survey all six above-mentioned cohorts at least once a year. The representative starting cohorts are composed of infants, 4-year-olds attending Kindergarten, 10- to 11-year-olds in fifth grade, 14- to 15-year-olds in ninth grade, first-year undergraduate students in higher education, and 23- to 64-year-old adults. For the infant, Kindergarten, fifth-grade, and ninth-grade samples, the NEPS will also survey their parents, selected Kindergarten staff, teachers, and school principals. Hence, at the end of the current phase of funding in 2013, we shall have detailed information on the following stages of educational attainment in the life course: (a) development in the first 2 years of life; (b) from Kindergarten through school enrollment up to the middle of elementary school; (c) Grades 5 to 8 of lower secondary school; (d) Grades 9 and 10 and the subsequent transitions to vocational training and the labor market; (e) Grade 9 in upper secondary school and the subsequent transitions to higher education, vocational training, or the labor market; (f) higher education and the subsequent transitions to the labor
market or to a Master’s course after successfully completing a Bachelor’s degree; and (g) the further education and employment careers of adults spanning a 5-year period.

To document and analyze historical changes in the way people pass through these stages (e.g., transitions from school to vocational training as a function of available apprenticeships, or the impact of educational reforms), new starting cohorts will also be recruited in later years (creating a succession of cohorts).

In order to assess the structural and compositional features of institutional learning environments, cluster samples will be recruited in the domains of Kindergarten, school, and (applied or theoretically oriented) higher-education institutes. This means, for example, that as many students as possible in a class will be recruited for the NEPS. As well as permitting data analyses on multiple levels, this has the advantage of greatly reducing the costs of carrying out competence tests and interviews. In subsequent years, all these participants will be followed up even if they are no longer in the same group or class or studying the same subject at a university. This makes it possible to extend documentation to cover the educational pathways of students who repeat a school year, change the type of school they attend or their study course, or drop out of school or higher education—thus permitting, for example, analyses of the educational careers of at-risk students. For the infants and for the adults in the domains of vocational training and further education, recruiting such
institution-based cohorts is either impossible or too costly and time-consuming. As a result, individual samples will be preferred here; or, alternatively, all students in the cluster samples will be followed up individually after their transition from general education to vocational training.

To permit specific analyses of people with a migration background, these groups will be oversampled in selected cohorts. A sufficient number of cases will be recruited to permit group-specific analyses in at least two groups: people whose families came originally from Turkey and people in ethnic German immigrant families from the former Soviet Union (Spätaussiedler).

- The National Educational Panel Study has two different kinds of samples: institution-based samples and individual samples.
- In subsequent years, participants will be followed up even if they are no longer in the same group or class.
- This permits analyses of, e.g., the educational careers of students who repeat a school year, change the type of school or their study course, or drop out of school or higher education.
Expected Benefits of the National Educational Panel Study

Up to now, too little is known about the cumulative and interdependent processes in the acquisition of education, or about how education is acquired in different learning environments across the life span. The NEPS will deliver the first nationally representative database with a multilevel structure providing longitudinal information on individual educational careers and competence development while simultaneously documenting information on the family, peers, the education institutes attended, the training centers and workplaces, and general living conditions. With its rich potential for analyses in various disciplines (demography, economics, educational science, psychology, sociology, etc.), the data will make it possible not only to test discipline-specific theories more effectively but also to formulate integrative approaches toward interdisciplinary theories in educational science. In particular, this should generate new knowledge about competence development in the life course; the role of educational institutions, families, and peers in the acquisition of education; the causes of socially unequal education decisions; the acquisition of education in migrant groups; as well as the consequences of competencies, certificates, and educational paths for (later) private and occupational paths through life.

Data collected for the NEPS are 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 analyze the data as exhaustively as
possible, thereby contributing to the greatest possible progress in educational research.

The NEPS will not only deliver innovative impulses for basic research but also provide major information for policymakers. In particular, it will be an important additional source of data for national educational reporting, and it will bolster the domain of education in the life course and our knowledge about developmental processes and trajectories. In the mid-term, it will also become possible to study political reforms and their effects on, for example, the acquisition of competencies or equal opportunity in the education system.

In sum, we expect the NEPS to decisively improve the framing conditions for empirical education research in Germany, make a major contribution to promoting the careers of young scientists, and lead to a marked improvement in the international standing of German educational research.

- New knowledge about competence development in the life course
- Innovative impulses for basic research
- Major information for policy makers
- Promoting the careers of young scientists
- Improvement in the international standing of German educational research
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