NEPS
National Educational Panel Study

Research Data

Information on Competence Testing

NEPS Starting Cohort 6 — Adults

Adult Education and Lifelong Learning

Wave 3: 24-67 years

LIfBi
LEIBNIZ INSTITUTE FOR
EDUCATIONAL TRAJECTORIES

Information on testing	
Test situation	Individual interviews, normally held at the test person's home
Test sequence	The test are predetermined in two different sequences and with a varying number of domains (random order of the test booklets for the study participants: **Test order test booklet 1**: reading speed, mathematical competence + procedural metacognition, reading competence + procedural metacognition **Test order test booklet 2**: reading speed, reading competence + procedural metacognition, mathematical competence + procedural metacognition **Test order test booklet 3**: reading speed, mathematical competence + procedural metacognition **Test order test booklet 4**: reading speed, reading competence + procedural metacognition
Test duration (net processing time)	Depending on the number of tests used: **Test booklet 1:** 62 min **Test booklet 2:** 62 min **Test booklet 3:** 31 min **Test booklet 4:** 33 min
Breaks	Only short breaks between the individual tests

Information on the individual tests

Construct	**Number of Items**	**Allowed Processing Time**	**Survey Mode**	**Next Measurement (until 2013)**
Reading-related measures				
Reading speed	51	2 min	paper-pencil	-
Reading competence	32	28 min	paper-pencil	-
Mathematical competence	22	28 min	paper-pencil	-
Domain-specific procedural metacognition				
Regarding the reading competence domain	6	3 min	paper-pencil	-
Regarding the mathematical competence domain	1	1 min	paper-pencil	-

Preliminary note

The development of the individual tests is based on framework concepts. They constitute overarching concepts on the basis of which education-relevant competences are to be shown consistently and coherently over the entire personal history. Therefore, the following framework concepts that served as a basis for the development of the test tools to measure the above-mentioned constructs are identical in the different studies.

Reading speed

In addition to the reading competence test which focuses on reading comprehension, an indicator of the reading speed is collected where primarily basal reading processes and/or their automation are given priority. The test which is processed by the study participants within two minutes is based on the test design principles of the two Salzburg reading screenings (e.g. Auer, Gruber, Mayringer & Wimmer, 2005). The test material, however, was newly designed for use by the National Education Panel. The study participants are given a total of 51 sentences which can normally be answered with the aid of general world knowledge, in other words no specific content-related previous knowledge is required (e.g. ”mice can fly”). After each sentence, the participant has to check whether the sentence is correct in terms of content (“true“) or not (”false“). When taking the test, participants mainly differ from each other by the number of sentences they are able to process within the given time limit. As a result of the less demanding material in terms of content, differences between participants with proportionately falsely processed sentences are to be neglected. The measure of the reading speed is determined by the number of sentences correctly judged during the two-minute processing limit.

Bibliography

Auer, M., Gruber, G., Mayringer, H. & Wimmer, H. (2005). Salzburger Lesescreening für die Klassenstufen 5-8. Göttingen: Hogrefe.

Reading competence

The ability to understand and use written texts is an important precondition for further developing personal knowledge and personal skills, and a prerequisite for participating in cultural and social life. Manifold areas of knowledge and life are made accessible through reading. The range of reading occasions is very wide, and reading fulfills many different functions (cf. Groeben & Hurrelmann, 2004). They range from reading for expanding knowledge which is crucial to further education and lifelong learning to literary-esthetic reading. Not only do texts convey information and facts, but they also transport ideas, moral concepts and cultural contents. Accordingly, the concept of reading competence in the National Education Panel takes functional understanding as a basis for reading competence, as is also reflected in the Anglo-Saxon *Literacy* Concept (also see OECD, 2009), with the focus on competent handling of texts in different typical everyday situations.

In order to represent the concept of reading competence over the entire life span as coherent as possible, three characteristic features were specified in the framework concepts for the NEPS reading competence test. They are considered in the following age and stage-specific test forms:

1. Text functions, text types respectively,
2. Comprehension requirements,
3. Task formats.

1. Text functions/text types

NEPS distinguishes between five text functions and associated text types which are represented in each version of the test: a) factual texts, b) commenting texts, c) literary texts, d) instructions and e) advertising texts. This selection is based on the assumption that these five text functions are of practical relevance to the study participants of various ages. The text functions and/or text types can be characterized as follows:

Texts conveying factual information represent basic texts for learning, fundamental acquisition of knowledge and extraction of information; examples are: articles, reports, reportages and announcements. Texts with a commenting function are texts in which a stand is taken or a controversial question is discussed and in which a reflecting level is integrated. This is where, for the study and adult cohorts, for example, ingenious essays or humorous comments are found; and where, in the student cohorts, the blessing and curse of smoking could be discussed. The literary-esthetic function of texts was included in the third category; here short stories and extracts from novels or stories can be found. As a result of their specific reception that is presumably strongly dependent on educational track and curriculum, specific literary text types such as stage plays, satires or poems were excluded. The fourth category comprises text types conveying product inserts such as engineering and operating instructions, package inserts for medication, work instructions, cooking recipes etc. The fifth category (appeals, advertising) includes text types such as job advertisements, recreation programs etc. The five selected text functions and, thus, associated text types are realized as a longitudinal concept in each test booklet over the life

span, which means that each test/each test booklet, for measuring the reading competence, contains a total of five texts corresponding to the five text functions.

Unlike the PISA studies, NEPS does not include discontinuous texts such as graphics, tables, road maps etc. Discontinuous texts are not contained in the NEPS concept as they pose high demands on readers and, in addition, are not significant for every age group for which reading competence is tested in NEPS.

Age-specific selection (text complexity, topic selection/task requirements):

For each age cohort, texts were and are selected according to thematic orientation and lexical, semantic and grammatical properties that have to be appropriate for the respective group of readers. By increasing text complexity (larger vocabulary, longer words, foreign words), increased complexity of the sentence structures) as well as the basic length of texts, the test design takes into account the increasing reading competence from childhood to early adulthood. In addition, texts are selected in order to ensure that topics correspond to the environment of the respective age group. This covers a wide spectrum of topics ranging from animals (for children) to social and philosophical questions relating to the meaning of life for adults. Additionally, the test material is adjusted to the respective age group through age-adapted phrasing of the questions, answering options and the comprehension requirements of the tasks.

2. Comprehension requirements / task types

From the literature on reading competence and text comprehension (e.g. Kintsch, 1998; Richter & Christmann, 2002), it is possible to derive different types of comprehension requirements reflected in the NEPS concept in three specific requirement types of the tasks (task types). The variants are called *types* as there is no explicit assumption that tasks of one type are necessarily more difficult or easier than tasks of another type.

For tasks of the first type ("finding information in the text"), detailed information must be identified at sentence level, in other words deciphering and recognizing statements or propositions. For tasks on this requirement cluster, the information needed to solve the respective tasks is, in terms of the wording, either contained in the text and identical with the task itself, or phrasing varies slightly.

In the case of the second task type ("drawing text-related conclusions"), conclusions have to be drawn from several sentences to be related to each other in order to extract local or global coherence. In some cases, this takes place between sentences located closely together, in others several sentences are spread over entire sections. In another form of this type, the task is to understand the thoughts expressed in the entire text, which requires the comprehension and integration of larger and more complex text portions.

For the third type, the requirements of "reflecting and assessing" are in the foreground, which in the literature is often linked to the mental representation of the text in the form of a situation model. In one version of this task type, the task is to understand the central idea, the main events or the core message of text, whereas in another version, the purpose and intention of a text has to be recognized and the readers are asked to assess the credibility of a text.

The different comprehension requirements occur in all text functions and are considered in the respective test versions in a well-proportioned ratio. (cf. Fig. 1.).

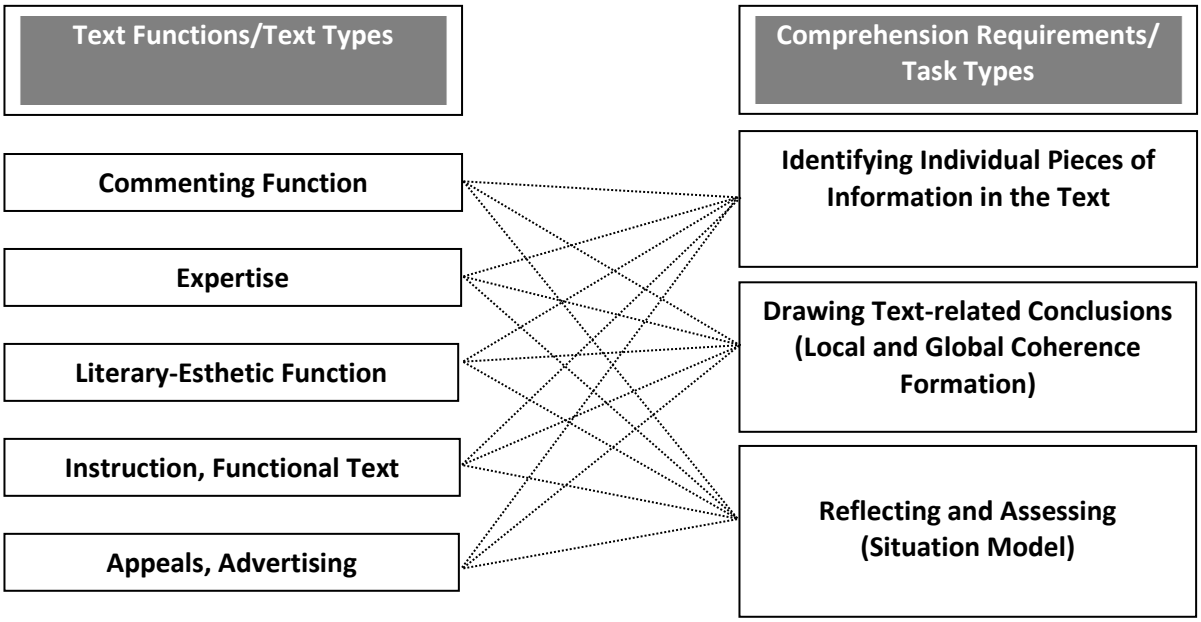

Fig. 1: Text functions and comprehension requirements

3. Task formats

The majority of tasks match the multiple choice format. Tasks of this type consist of a question/assignment on a text for which four different answers are offered, one of which is the correct answer. As another task format, decision-making tasks are used where individual statements have to be judged on whether they are right or wrong according to the text. The so-called correlation tasks represent a third format where, for example, a partial title must be chosen and assigned to different sections of a text. For tasks of the second and third type, summaries are made, if necessary, thus creating answers with partly correct solutions (partial credit items).

By systematically considering different text functions, which are implemented in different age groups in realistic and age-related texts, text themes and different comprehension requirements of the related tasks, it is possible to operationalize reading competence as a comprehensive ability construct.

Bibliography

Groeben, N. & Hurrelmann, B. (Hrsg.) (2004). Lesesozialisation in der Mediengesellschaft: Ein Forschungsüberblick. Weinheim: Juventa.

Kintsch, W. (1998). Comprehension. A paradigm for cognition. Cambridge: University Press.

OECD (2009). PISA 2009 assessment framework – Key competencies in reading, mathematics, and science. Paris: OECD

Richter, T. & Christmann, U. (2002). Lesekompetenz: Prozessebenen und interindividuelle Unterschiede. In N. Groeben, B. Hurrelmann (Hrsg.), Lesekompetenz: Bedingungen, Dimensionen, Funktionen (S. 25-58). Weinheim: Juventa.

Mathematical competence

In the National Education Panel Study, the construct of *mathematical competence* is based on the idea of *mathematical literacy* as was defined, for example, in PISA. Thus, the construct describes "[…] an individual's capacity to identify and understand the role that mathematics plays in the world, to make well-founded mathematical judgements and to use and engage with mathematics in ways that meet the needs of that individual's life as a constructive, concerned and reflective citizen." (OECD, 2003, 24). Regarding younger children, this idea refers to competent handling of mathematical problems in *age-specific contexts.*

Accordingly, mathematical competence in NEPS is operationalized by items assessing more than pure mathematical knowledge; instead, solving the items requires recognizing and flexibly applying mathematics in realistic, mainly extra-mathematical situations.

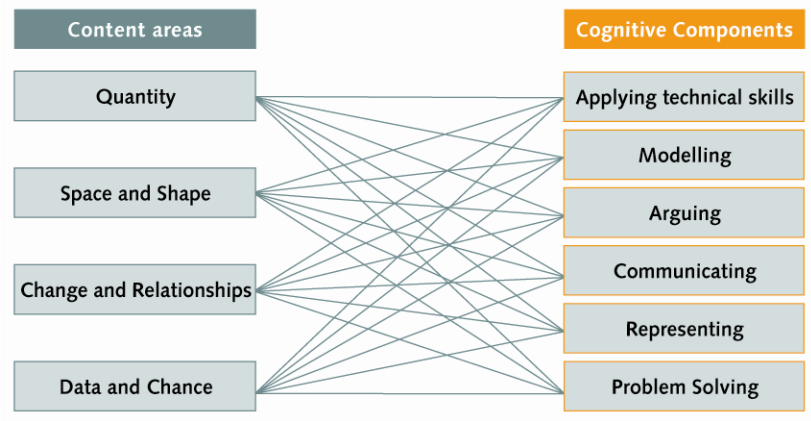

Fig. 1: Framework of mathematical competence in NEPS

The NEPS framework of mathematical competence distinguishes between content-related and process-related components (cf. Fig. 1). In detail, the content areas are characterized as follows:

- **Quantity** comprises all kinds of quantifications when numbers are used to organize and describe situations.
  Examples from the *elementary sector*: comparisons of sets, counting (ordinal/cardinal aspects of numbers), simple operations (e.g., adding)
  Examples from the *adult sector*: calculations of percentages and interests, calculations of area and volume, use of different units, simple equation systems
- **Space and Shape** includes all types of planar and spatial configurations, shapes or patterns.
  Examples from the *elementary sector*: recognizing geometric shapes, simple properties of shapes, perspective
  Examples from the *adult sector*: three-dimensional mathematical objects, geometric mappings, elementary geometric theorems
- **Change and Relationships** includes all kinds of (functional) relationships and patterns.
  Examples from the *elementary sector*: recognizing and continuing patterns, relationships among numbers, proportionality

Examples from the *adult sector*: interpreting curves or function graphs, properties of linear, quadratic, and exponential functions, extremum problems

- **Data and Chance** comprises all situations involving statistical data or chance.
  Examples from the *elementary sector*: intuitively assessing probabilities, collecting and structuring data
  Examples from the *adult sector*: interpreting statistics, basic statistical methods, calculating probabilities

The cognitive components of mathematical thinking processes are distinguished as follows:

- **Applying technical skills** includes using known algorithms and remembering mathematical knowledge or calculation methods.
- **Modelling** includes the representation in a situation model and in a mathematical model as well as interpreting and validating results in real-life situations.
- **Arguing** includes assessing explanations and proofs, but also developing own explanations or proofs.
- **Communicating** requires communication on mathematical contents and includes, among other things, the correct and adequate use of mathematical technical terms.
- **Representing** comprises the use and interpretation of mathematical representations such as tables, charts or graphs.
- **Problem Solving** takes place, when there is no obvious approach, and, therefore, includes systematic trying, generalizing or examining special cases.

This differentiation renders the framework concept of mathematical competence in NEPS compatible with both the PISA studies and the German National Mathematics Education Standards. The test items used in NEPS refer to one content area that is mainly addressed by the item, but may well contain several cognitive components.

Bibliography

Organisation for Economic Co-Operation and Development [OECD] (2003). The PISA 2003 assessment framework – mathematics, reading, science and problem solving knowledge and skills. Paris: OECD.

Metacognition

Metacognition is the knowledge and control of the own cognitive system. According to Flavell (1979) und Brown (1987), declarative and procedural aspects of metacognition are differentiated which are both covered in the National Education Panel.

Procedural metacognition

Procedural metacognition includes the regulation of the learning process through activities of planning, monitoring and controlling. Within the framework of NEPS in combination with the competence tests of the individual domains, the procedural aspect of metacognition is not assessed as a direct measure of such planning, monitoring and controlling activities but as a metacognitive judgement that refers to the control of the learning performance during (and/or shortly after) the learning phase (also see Nelson & Narens, 1990). After the study participants have taken their competence tests, they are requested to rate their own performance. They are asked to state the portion of questions presumably answered correctly.

Usually, one question is asked per domain. For competence domains that can be divided into coherent individual parts (e.g. reading competence referring to different texts), the inquiry of procedural metacognition is referred to these parts as well, which, of course, leads to a longer processing time.

Bibliography

Brown, A. L. (1987). Metacognition, executive control, self-regulation, and other more mysterious mechanisms. In F. E. Weinert and R. H. Kluwe (Eds.), *Metacognition, motivation, and understanding* (pp. 65-116). Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Flavell, J. H. (1979). Metacognition and Cognitive Monitoring: A New Area of Cognitive-Developmental Inquiry. *American Psychologist, 34*, 906-911.

Nelson, T.O. & Narens, L. (1990). Metamemory: A theoretical framework and new findings. In G.H. Bower (Hrsg.), *The psychology of learning and motivation* (pp. 125-141). New York: Academic Press.