NEPS
National Educational Panel Study

Research Data

Information on Competence Testing

NEPS Starting Cohort 2 — Kindergarten

From Kindergarten to Elementary School

Wave 1: Children in Kindergarten (4-5 years)

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Information on testing	
Test situation	Individual testing at the institutions, testing in a separate room, 1 survey supervisor
Test sequence	The tests are held on two test days. **Sequence on test day 1**: picture-based tests: scientific competence + procedural metacognition **Sequence on test day 2**: picture-based tests: listening comprehension at sentence level: receptive grammatical competence + procedural metacognition, listening comprehension at word level: receptive vocabulary + procedural metacognition
Test duration (net processing time)	63 minutes
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)**
Test day 1				
Scientific competence	26	30 min	Picture-based answer format	After 2 years
Procedural metacognition regarding the natural sciences domain	1	1 min	Picture-based answer format	See above
Test day 2				
Listening comprehension				
Listening comprehension at sentence level: receptive grammatical competence	48	10 min	Picture-based answer format	After 2 years
Listening comprehension at word level: receptive vocabulary	77	20min	Picture-based answer format	After 2 years
Domain-specific procedural metacognition				
Regarding the receptive grammatical competences	1	1 min	Picture-based answer format	See above
Regarding the receptive vocabulary domain	1	1 min	Picture-based answer format	See above

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.

Scientific competence

Scientific competence is the precondition for participating in world affairs marked by science and technology (Prenzel, 2000; Prenzel et al., 2001; Rost et al., 2004) and is viewed as a predictor for an economically, socially and culturally successful life. Many problems and issues we encounter in our daily life require an understanding of natural sciences and technology. Scientific topics and problems affect all people. Therefore, the current discussions of the goals of scientific education focus on the concept of scientific literacy for all people (Osborne & Dillon, 2008). Such literacy is the basis for lifelong learning, serves as a connection for further learning (OECD, 2006; Prenzel et al., 2007) and, thus, also influences professional careers.

Based on this, the NEPS definition of scientific competence follows the Anglo-Saxon literacy concept (Bybee, 1997; Gräber, Nentwig, Koballa & Evans, 2002; OECD, 2006) that does not regard scientific competence as a simple reproduction but rather as flexible use of acquired knowledge in different situations and contexts of daily life.

In NEPS, scientific competence is understood as the use of scientific knowledge in the environmental, technological and health contexts. In addition, the concept distinguishes between content-related and process-related elements (see Fig. 1). In selecting its contexts as well as the content-related and process-related elements, NEPS uses the education standards of the Conference of Ministers of Education for the medium-level school-leaving qualification (KMK, 2005) and the *Benchmarks for Scientific Literacy* of the *American Association for the Advancement of Science* (AAAS, 1989, 2009) as a guideline. The selected contexts are of personal, social and global relevance. Considering the current scientific research and the general events of the day, it is assumed that they will remain important across the entire life span.

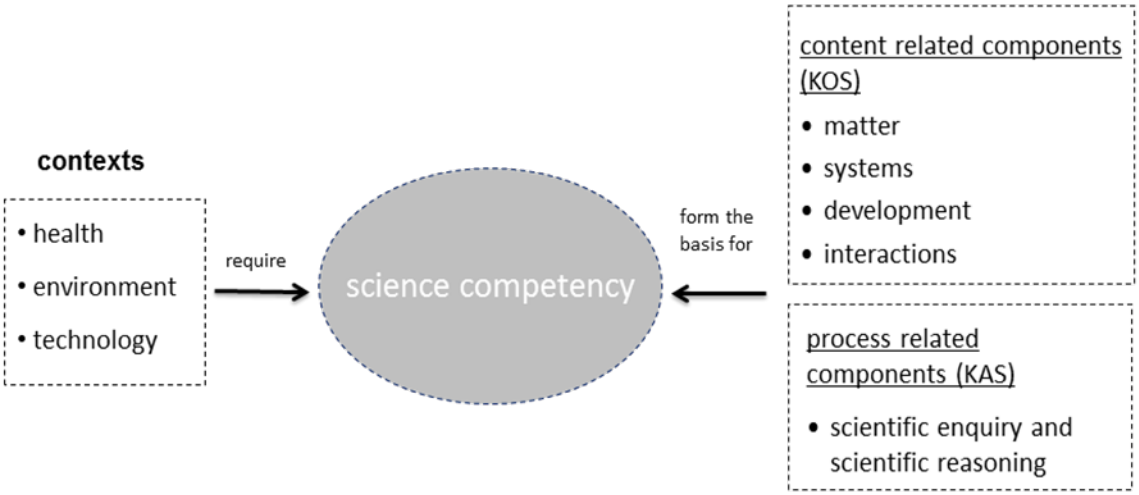

Fig.1: Application contexts as well as content-related and process-related elements of scientific competence of the NEPS scientific test.

The selected content-related and process-related elements cover central concepts of all scientific disciplines. The scientific knowledge domain comprises the content-related matter, *systems*, *development* and *interactions*. The knowledge of natural sciences includes *inquiry*

and scientific reasoning that deal, among other things, with checking hypotheses, interpreting findings as well as measuring principles and measuring error control.

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Metacognition

Metacognition is the knowledge about and control of the own cognitive system. According to Flavell (1979) and Brown (1987), the NEPS distinguishes declarative and procedural aspects of metacognition.

Procedural metacognition

Procedural metacognition includes the regulation of the learning process through activities of planning, monitoring and control. Within NEPS the procedural aspect of metacognition is not assessed as a direct measure of such planning, monitoring and control activities but as a metacognitive judgement along with the domain-specific competence tests (judgment of performance during/shortly after the learning phase; see also Nelson & Narens, 1990). After the participants have completed all items of the respective competence tests, they are asked to estimate their own performance in the domain-specific competence test.

In general, one judgment about the portion of correctly given answers is inquired per competence domain. For competence domains divided into coherent individual parts (e.g. reading competence assessed by providing items referring to several texts), the assessment of procedural metacognition is referred to these parts as well, resulting in a longer assessment time.

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Listening comprehension at word, sentence and text/discourse level as indicators of linguistic competence in German

The importance of linguistic competence for learning in school as well as for explaining social disparities during school careers is largely undisputed.

In NEPS, the linguistic competences in German are measured through listening comprehension at word, sentence and text/discourse level on the one hand, and – from 2nd grade elementary school – through reading ability indicators (reading competence, reading speed) on the other where, however, not all indicators are measured at each survey. In nursery school, for the start cohort on the 1st measuring date at the age of about 4 years, listening comprehension is measured at word and sentence level.

Listening comprehension at word level: receptive vocabulary

Measures of the receptive vocabulary represent a favorable, internationally compatible indicator for the acquired language abilities and skills of children and adults. In numerous, comprehensive international, panel studies such as the Head Start Family and Child Experiences Survey – FACES (USA)[1], the National Longitudinal Survey of Children and Youth – NLCSY (Kanada; u.a. Lipps & Yiptong-Avila, 1999)[2], the British Cohort Study – BCS70 (z.B. Bynner, 2004) or the European Child Care and Education (ECCE) Study carried out in Germany, Austria, Spain and Portugal (e.g. European Child Care and Education (ECCE) Study Group, 1997), the receptive vocabulary is measured as a central and sometimes even sole indicator of the cumulatively acquired linguistic-cognitive abilities against the background of individual basic skills (e.g. working memory capacity, speed variables) and Environmental stimulation.

The internationally most used instrument for measuring the receptive vocabulary certainly is the ***Peabody Picture Vocabulary Test (PPVT***; Dunn, 1959; Dunn & Dunn, 1981, 1997, 2007) which is now available in different versions. Basically, the PPVT can be used over a wide age spectrum and is also easy to carry out and evaluate.

As a published German version of the PPVT is available only for older children from an age of 13 years (Dunn & Dunn, 2004), a procedure analogous to PPVT was prepared for NEPS which is based on data of the ECCE and BiKS studies. Within the framework of the BiKS study, in the longitudinal BiKS-3-10 analysis, a German research version of PPVT (Roßbach u.a., 2005) is used which is based on the data of the ECCE study (European Child Care and Education (ECCE) Study Group, 1997). Based on the BiKS data of 504 children between 3;10 and 5.7 years (M= 4.6; SD=0.37), 77 items were selected via IRT analyses that are particularly selective for this age range and arranged in one test instrument by complexity.

The task of the children is to select the correct picture for each predetermined individual word from a set of four pictures. The test is carried out at pre-school age in a playfully arranged individual test situation. In order to avoid overstraining of the children in case of poor performance, the test is stopped after six consecutive wrong answers.

[1] http://www.acf.hhs.gov/programs/opre/hs/faces/
[2] http://www.statcan.ca/english/sdds/4450.htm

Listening comprehension at sentence level: receptive grammatical competences

In view of the so-called "erudite language" which, compared to everyday speech, is normally characterized as more decontextualized and grammatically more complex and which is regarded as very significant particularly at school, the grammatical competences of children are viewed as being of special importance to listening comprehension in class.

The "Test for Reception of Grammar" by Bishop (1989) provides an internationally compatible method of which a German translation has been available since 2006 (Fox, 2006). In order to cover the abilities of sentence processing, more exact: of processing/comprehension of linguistic structural forms, sentences of different grammatical structure are given. From a number of pictures, the one has to be assigned to each of these sentences that corresponds to the respective sentence. It is ensured that the words used are known. Suitable distractors are used to selectively test semantic, syntactic or morphological aspects of understanding grammatical structural forms (cf. TROG-D, Fox 2006).

In NEPS, a shortened version of the TROG-D "Tests for Reviewing Grammatical Understanding" (Fox, 2006) is used. This consists of 48 items, with two items being predetermined for each structural form. In nursery school, it is carried in a playfully arranged individual test situation. The sentences are given by CD to ensure a standardized presentation of the items.

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