NEPS
National Educational Panel Study

Research Data

Information on Competence Testing

NEPS Starting Cohort 4 — Grade 9

School and Vocational Training — Educational Pathways of Students in Grade 9 and Higher

Wave 5: Grade 11

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Information on testing					
Test setting	Group testing in classrooms of the regular school, normally with 1 test instructor and 1 supervisory teacher per test.				
Test sequence	The test took place on one day. Scientific literacy was the only competency measured. A procedural metacognition question followed the scientific literacy test.				
Test duration	29 minutes + 1 minute for the procedural metacognition question.				
Construct		**Number of items**	**Allowed processing time**	**Survey method**	
Scientific literacy		29	29 min	paper pencil	
Domain specific procedural metacognition regarding scientific literacy		1	1 min	paper pencil	

Preliminary note

The development of the individual tests is based on special frameworks. They constitute overarching concepts on the basis of which relevant competencies of education are to be shown consistently and coherently over the entire life span. Therefore, the following framework that served as a basis for the development of the tests to measure the above mentioned construct is identical in the different studies.

Scientific Literacy

NEPS's definition of scientific literacy derives from the Anglo-Saxon concept of literacy (Bybee, 1997; Gräber, Nentwig, Koballa & Evans, 2002; OECD, 2006), viewing scientific competence not sole as the reproduction but rather as the application of knowledge in different situations and contexts of everyday life. Scientific literacy is the prerequisite to participate in a world driven by science and technology (Prenzel, 2000; Prenzel et al., 2001; Rost et al., 2004) and is viewed as a predicator for an economically, socially, and culturally successful life. Scientific literacy is one part of the foundation for lifelong learning (OECD, 2006; Prenzel et al. 2007) thus influencing career choices and career developments.

NEPS defines scientific literacy as the application of science knowledge within the contexts of environment, technology, and health. Additionally the NEPS framework distinguishes between content-related and process-related components (figure 1). It follows the PISA-framework (OECD, 2006), the German Educational Standards for biology, chemistry, and physics at the end of Grade 10 (KMK, 2005a,b,c), and the Benchmarks for Scientific Literacy of the American Association for the Advancement of Science (AAAS, 2009) thus fulfilling the requirement that the NEPS framework can be linked to international large scale assessments in the field of competence assessment. The chosen contexts of health, environment, and technology are of personal, social, and global significance. New research and the events of the day show that they continue to be relevant throughout a person's life span. The content-related and process-related components cover the central concepts of all of the science disciplines. In the area of knowledge of science this includes matter, development, interactions, and systems. The knowledge about science contains scientific inquiry and reasoning such as to test hypotheses, interpret findings, and the principals of measurement and measurement errors.

The test results of the content-related and process-related components lead to a composite value assessing scientific literacy.

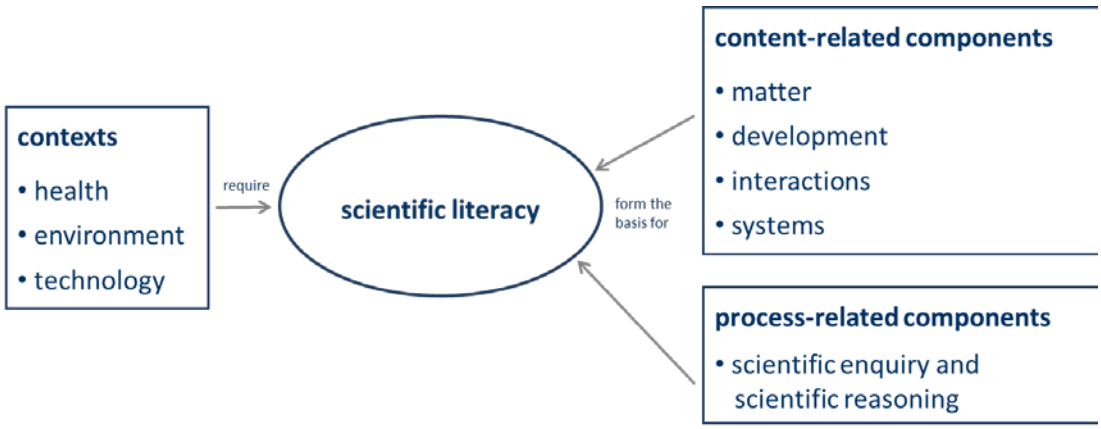

Figure 1: Implementation contexts as well as the content-related and process-related components scientific competence test of the NEPS-science tests

To assess the scientific competence of first-graders independent from their reading skills the test is administered by reading the questions and answer options to the students out loud. The answer options in the test material are given as pictures which will have to be checked. The test material is one-sided print containing one test question per page as to not overwhelm the children with too

much content. For better child appropriate navigation throughout the test material each page is marked with images (animals, plants, etc.) instead of page numbers.

References

American Association for the Advancement of Science. (AAAS). (2009). *Benchmarks for science literacy*. *Project 206.* Retrieved from http://www.project2061.org/publications/bsl/online/index.php

Bybee, R. W. (1997). Towards an understanding of scientific literacy. In W. Gräber & C. Bolte (Eds.), *Scientific literacy – An international symposium* (pp. 37–68). Kiel: Institut für die Pädagogik der Naturwissenschaften (IPN).

Gräber, W., Nentwig, P., Koballa, T. & Evans, R. (Eds.). (2002). *Scientific Literacy. Der Beitrag der Naturwissenschaften zur Allgemeinen Bildung.* Opladen: Leske + Budrich.

KMK (2005a). *Beschlüsse der Kultusministerkonferenz: Bildungsstandards im Fach Biologie für den Mittleren Schulabschluss.* Beschluss vom 16.12.2004. München: Luchterhand.

KMK (2005b). *Beschlüsse der Kultusministerkonferenz: Bildungsstandards im Fach Chemie für den Mittleren Schulabschluss.* Beschluss vom 16.12.2004. München: Luchterhand.

KMK (2005c). *Beschlüsse der Kultusministerkonferenz: Bildungsstandards im Fach Physik für den Mittleren Schulabschluss.* Beschluss vom 16.12.2004. München: Luchterhand.

OECD (2006). *Assessing scientific, reading and mathematical literacy: A framework for PISA 2006.* Paris: OECD.

Prenzel, M. (2000). Lernen über die Lebensspanne aus einer domänenspezifischen Perspektive: Naturwissenschaften als Beispiel. In F. Achtenhagen & W. Lempert (Eds.), *Lebenslanges Lernen im Beruf - seine Grundlegung im Kindes- und Jugendalter. Band IV. Formen und Inhalte von Lernprozessen* (pp. 175-192). Opladen: Leske + Budrich.

Prenzel, M. (2001). Voraussetzungen und Beispiel zu PUS. In M.-D. Weitze (Ed.), *Public Understanding of Science: Theorie und Praxis. Public Understanding of Science im deutschsprachigen Raum. Die Rolle der Museen* (pp. 49–61).

Rost, J. (2004). *Lehrbuch Testtheorie – Testkonstruktion*. Bern: Verlag Hans Huber.

Prenzel, M., Schöps, K., Rönnebeck, S., Senkbeil, M., Walter, O., Carstensen, C. & Hammann, M. (2007). Naturwissenschaftliche Kompetenz im internationalen Vergleich. In M. Prenzel, C. Artelt, J. Baumert, W. Blum, M. Hammann, E. Klieme & R. Pekrun (Eds.), *PISA 2006. Die Ergebnisse der dritten internationalen Vergleichsstudie* (pp. 63-105). Münster: Waxmann