Navigating Through the World of Health Information

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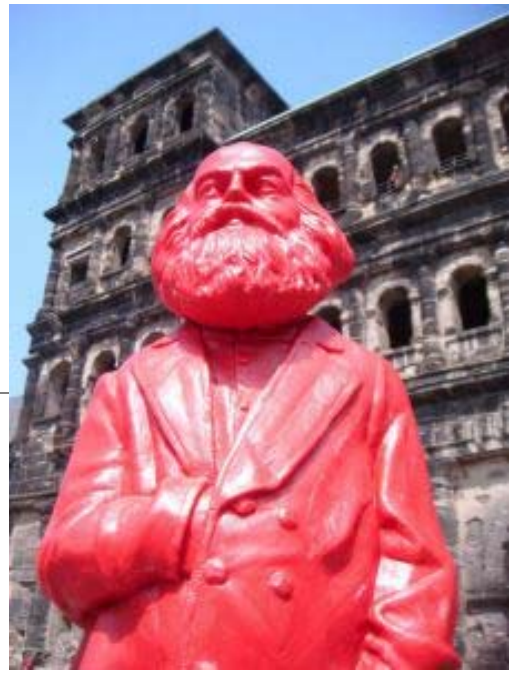

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ZPID and its Mission

- **Information for Psychology - supporting open science**:
  - reference database PSYNDEX
  - search portal PubPsych
  - data archive PsychData
  - publication platform PsychOpen
  - **www.zpid.de**

- **Research on information technologies and information behaviors:**
  - Improving technologies (e.g., data management tools, cross-lingual search technologies)
  - Supporting adequate information behaviour and information literacy

Outline

- Introduction
- Health Information Literacy: concept
- The Health Information Literacy Knowledge Test (HILK):
  - Construction
  - Findings: Associations with
    - subjective health (information) literacy measures
    - health information seeking: sources, strategies and evaluation criteria
    - epistemic beliefs about medicine
- Summary and outlook

Health Information Needs and Decisions in Everyday Life

- **norm/ideal to take responsibility for one's health** → information about issues related to prevention and health promotion)
- **concern over health issues, triggered by symptoms** → information about possible causes and necessity of treatment
- **health problems requiring contact with the medical system**
  - as a patient → information about treatment and self-management (e.g. shared decision-making, informed consent, management of chronic conditions) or
  - as a consumer → e.g., information about treatments not covered by health insurance

World of health information

- **easy & convenient access to numerous health information sources of highly divergent quality**
  - low quality: inaccurate, incomplete or “fake news”
  - high quality: medical reference databases, information portals, medical journals etc.

- **„information overload“ (e.g. Wilson, 2001):**
  - psychosocial stress
  - discontinue information searches
  - rely on inadequate information

- **predictors of health information overload (Kim et al., 2007):**
  - low search expertise
  - low topic-specific literacy / knowledge
  - high concerns about information quality
  - low level of education

Health Information Literacy: Definitions

- **„set of abilities needed to:**
  - recognize a health information need;
  - identify likely information sources and use them to retrieve relevant information;
  - assess the quality of the information and its applicability to a specific situation;
  - and analyze, understand, and use the information to make good health decisions."

(Medical Library Association MLA, 2003)

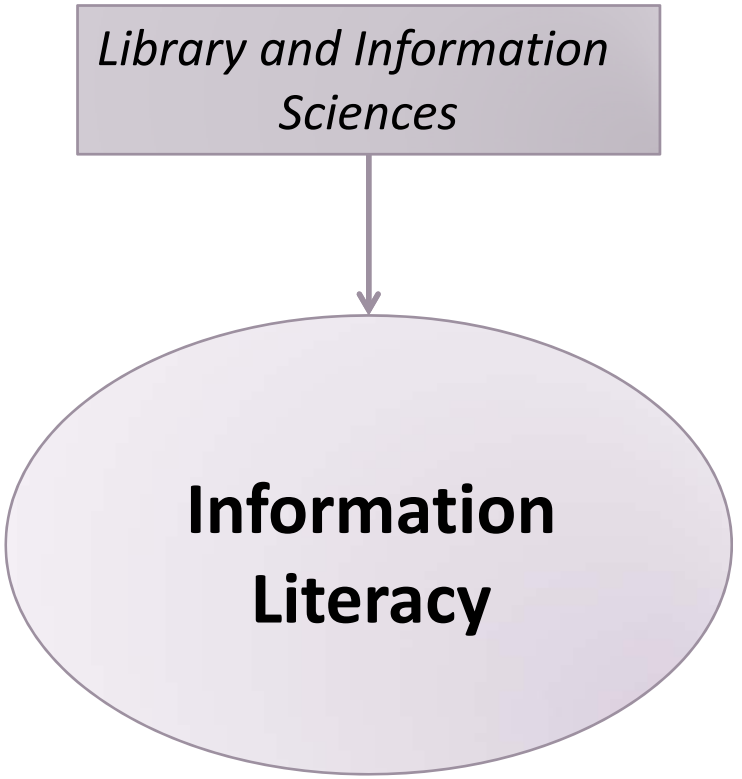
Basic Concepts

Medicine/Health Sciences/Psychology/
Communic. Sciences/Nursing Sciences

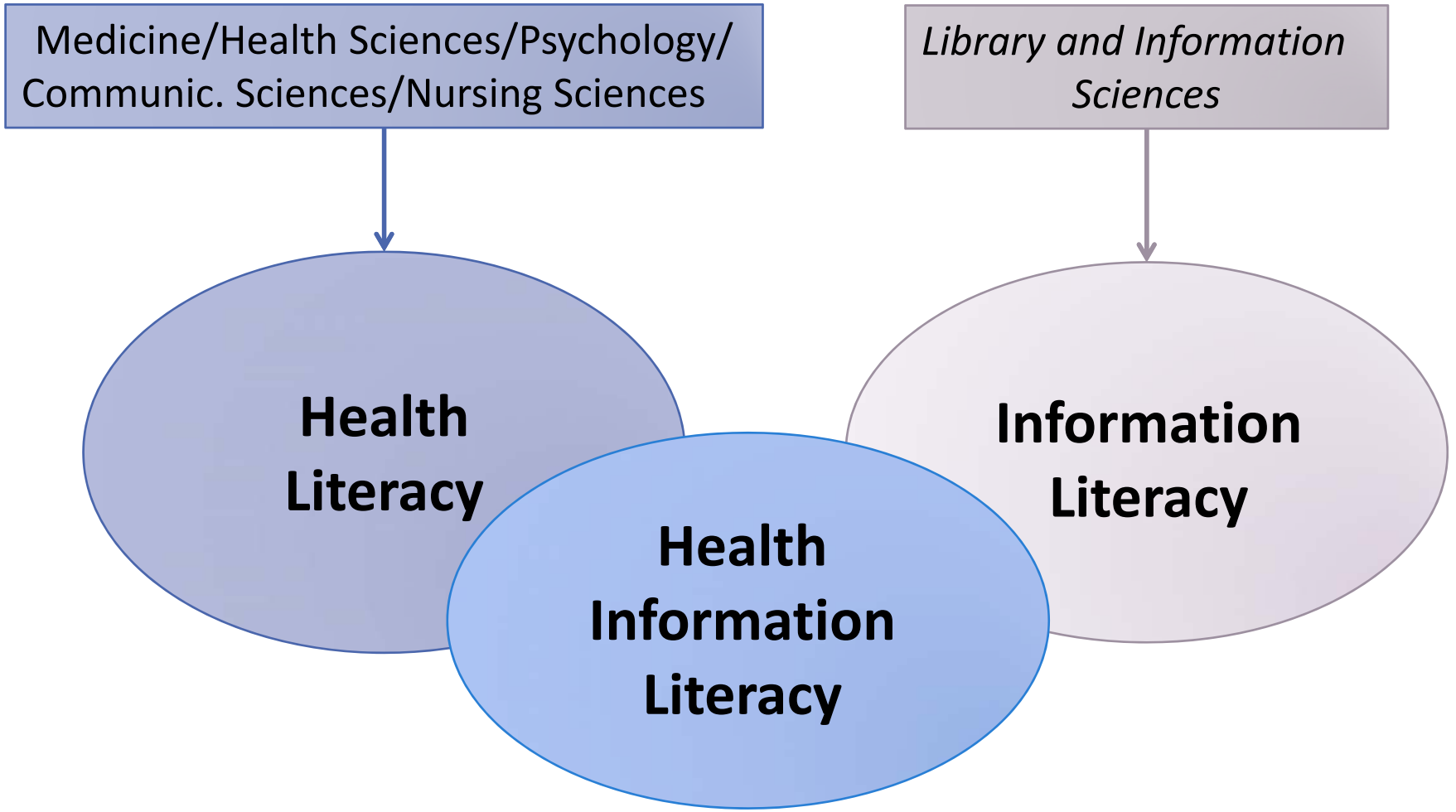
Definition: „people's knowledge, motivation and competences to access, understand, appraise, and apply health information in order to make judgments and take decisions in everyday life concerning healthcare, disease prevention and health promotion to maintain or improve quality of life during the life course" (Soerensen et al., 2012)

Basic Concepts

Definition: *set of knowledge and skills necessary to recognize an information need and to locate, evaluate, and use information adequately* (ACRL, 2000)



Basic Concepts



Standardized Assessment of Health Information Literacy

- **Perception-based/subjective measures**, e.g. self-report questionnaires:
  - **Everyday Health Information Literacy Screening Tool** EHILS (*k* = 10; Niemilä et al., 2012): Motivation to obtain health information and confidence in ability to find, evaluate and understand health information
  - **Self-Efficacy Scale for Information Behavior** SES-IB-16 (Behm, 2015): self-efficacy beliefs related to information behavior

- **Problem:** generally low validity of self-assessments of ability and competencies (e.g. Brackett & Mayer, 2003; Freund & Kasten, 2012; Kruger & Dunning, 1999; see Rosman, Mayer & Krampen, 2015, for scholarly information literacy)

Standardized Assessment of Health Information Literacy

- **Performance-based / objective measures** of health information literacy, e.g.
  - **Research Readiness Self-Assessment RSSA** (Ivanitskaya et al., 2006): scholarly information literacy of medical or health science students
  - **Critical Health Competence Test CHCT** (Steckelberg et al., 2009): understanding of medical concepts, statistics, experimental designs, sampling, …

- **Problems:**
  - limited relevance for everyday health information behaviors
  - too complex for people without university education

Health Information Literacy Knowledge Test

(HILK; Mayer & Holzhäuser, 2015)

- **Aim:** "objective", performance-based assessment of HIL by a test of "generic" knowledge about everyday health information seeking in various sources and basically evaluating the quality of information
- **Construction Background:** skill decomposition derived from process models of information seeking:
  - **Big6-Skills:** general descriptive process model of information literacy (Eisenberg & Berkowitz, 1990)
  - **Information Problem Solving using Internet model** (IPS-I, Brand-Gruwel et al., 2009)

Big6™ Skills (Eisenberg & Berkowitz, 1990)

1. Task Definition
- 1.1 Define the information problem
- 1.2 Identify information needed

2. Information Seeking Strategies
- 2.1 Determine all possible sources
- 2.2 Select the best sources

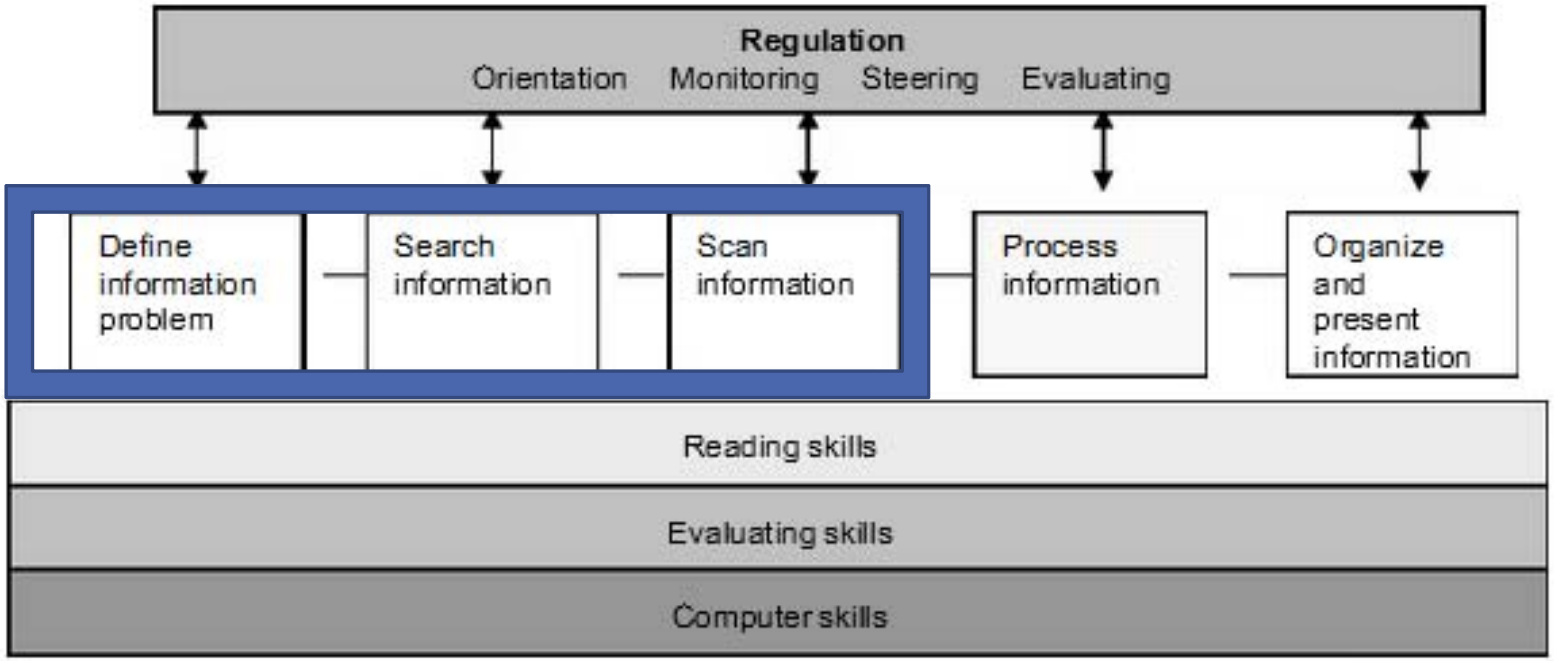
3. Location and Access
- 3.1 Locate sources (intellectually and physically)
- 3.2 Find information within sources

4. Use of Information
- 4.1 Engage (e.g., read, hear, view, touch)
- 4.2 Extract relevant information

5. Synthesis
- 5.1 Organize from multiple sources
- 5.2 Present the information

6. Evaluation
- 6.1 Judge the product (effectiveness)
- 6.2 Judge the process (efficiency)

Information Problem Solving using Internet model (IPS-I, Brand-Gruwel et al., 2009)



Skill Decomposition Underlying the HILK

→ **4 skills with 2 subskills each:**

1. Define the information need

1.1 Define the search problem (topic of health information search)
1.2 Identify information needed

2. Plan the search

2.1 Select information sources based on knowledge about qualities of these sources
2.2 Determine search strategy

3. Access information sources

3.1 Identify type of source
3.2 Gain access to source (e.g., full text)

4. Scan information

4.1 Assess relevance and basic quality of source
4.2 Find information within source

→ **Fixed Choice-Items:** 3 options each (0 - 3 correct) plus “don’t know”-option

Sample Items

Please take a look at the book covers below. Which book(s) probably contain(s) particularly balanced (e.g. pointing to advantages as well as disadvantages) information about „Health effects of sports in old age“?

	Does apply	Does not apply	Don‘t know
Book 1	☐	☐	☐
Book 2	☐	☐	☐
Book 3	☐	☐	☐

Sample Item

You want to find information on „Health Nutrition in Old Age“ to change your diet. Which of the following actions is the best first step during your information search. Please select only one answer.

	Does apply
I should reflect on the topic to see which aspects are most important for me ad how/where I might get information about these aspects.	☐
I should make an appointment with my physician to get some information.	☐
I should type „Healthy Nutrition in Old Age“ into the search mask of a Web Search Engine to see what is on the web.	☐
Don‘t know	☐

Sample Item

Which of the following aspects point(s) to the appraisal that a specific internet board/forum on health is a reliable discussion platform?

	Does apply	Does not apply	Don‘t know
The board is provided by a well-respected organization (e.g., a university or a patient organization).	☐	☐	☐
Medical experts (e.g., physicians) take care of board.	☐	☐	☐
The board explicitly points to the fact that internet information can not replace seeing a physician.	☐	☐	☐

HILK versions (Overview)

- **Draft version** (*k* = 57):
  - Expert Study (*N* = 11 psychologists with expertise in information literacy research): consensus about correct answers; refinement of item wording

- **Pilot version** (*k* = 53):
  - Study A (*N* = 138): P&P format
  - Study B (*N* = 100): online format, change in response mode

- **Final version** (*k* = 24):
  - selected based on exploratory factor analyses, item statistics, and content validity; further refinement of response mode

Psychometric Properties of the Final HILK

	Study 1	Study 2	Study 3
Sample size / domain of studies	*N* = 144 university students (languages, humanities, mathematics, computer sciences)	*N* = 144 university students (educational sciences, nursing sciences)	*N* = 317 vocational school students (administration, technology, health professions; Kuhberg & Mayer, in prep.)
Age/gender	18-36 yrs. (M = 23.4); 69% female	18-36 yrs. (M = 23.7); 73% female	16-34 yrs. (M = 20.8); 70% female
M (SD)	0.63 (0.11)	0.65 (0.10)	0.42 (0.13)
Range	.36-.86	.28-.86	.17-.81
p (item difficulties)	.17-.91	.18-.93	.08-.62
Cronbach‘s Alpha	.78	.72	.72

„Objective“and „Subjective“ H(I)L

Associations of the HILK with Self-Reported IL and HIL

	Study 1	Study 2
Self-Efficacy Scale for Information Behavior SES-IB-16 (Behm, 2015)	.28**	--
Everyday Health Information Literacy Screening Tool EHILS (Niemilä et al., 2012)	.22**	.32**

** $p < .01$

Associations of the HILK with Self-Reported HL

	Study 1	Study 2
HLS-EU-Q47 (Soerensen et al., 2013)		
Total Score (*k* = 47)	.13+	.20*
Access/obtain information (*k* = 13)	.14+	.24**
Understand information (*k* = 11)	.18*	.28**
Process/appraise information (*k* = 12)	.08	.09
Apply/use information (*k* = 11)	.04	.07
eHEALS (Norman & Skinner, 2006; German: Soellner et al., 2014; *k* = 8)	.13+	---

** $p < .01$; * $p < .05$; + $p < .10$

HIL and Self-Reported Information Behaviors

HILK and Sources „Typically“ Used in Health Information Searches

When seeking information about health and illness, I get xx percent of information from ...	Percentage M (SD)	r (HILK)
experts	27 (22)	-.25**
laypeople	20 (13)	-.05
printed sources	15 (12)	.13
digital / internet sources	38 (21)	.21*

HILK and Cognitive and Metacognitive Activities During Information Search

Information Behavior Questionnaire (Mayer, in prep.)	Study 2
Planning (*k* = 5)	.15*
Monitoring (*k* = 6)	.08
Openness for Information (*k* = 6)	.25**
Reflection (*k* = 3)	.04

** $p < .01$; * $p < .05$

Associations of the HILK with Evaluation Criteria „Typically“ Applied

	Study 1	Study 2
Formal/scientific quality (*k* = 8)	.26**	.35**
Clarity of presentation (*k* = 4)	-.19*	-.13+

** $p < .01$; * $p < .05$; + $p < .10$

Summary

- **HIL (as assessed by the HILK) is associated with some HIBs that should be „functional“ with regard to navigating through the health information world:**
  - systematic planning of the search process
  - open-mindedness during the search
  - application of adequate evaluation criteria
  - critical stance toward (often) unreliable sources of health knowledge

HIL and Epistemic Beliefs about Medicine

Epistemic Beliefs

- **Definition:** individual conceptions of the nature of knowledge and knowing (Hofer & Pintrich, 1997) , e.g.,
  - *Structure: How "simple"/certain versus "complex"/uncertain is knowledge?*
  - *Stability: How "stable" vs. "dynamic" is it over time?*
  - *Justification: How / by which sources may knowledge claims be justified?*

  → domain-general vs. domain-specific (e.g., medicine)

- **developmental sequence** (Kuhn & Weinstock, 2002; Hofer & Pintrich, 1997): *absolute → relativistic → evaluativistic*

Associations of the HILK With Epistemic Beliefs About Medicine

Epistemic Beliefs Assessment for Medicine (EBAM) questionnaire (Kienhues & Bromme, 2012)	Study 1	Study 2
Certainty of knowledge (*k* = 9)	-.13+	-.09
Stability of knowledge (*k* = 4)	-.13+	-.12+
Source of knowledge: Trust in laypeople (vs. research; *k* = 3)	-.33**	-.27**
Source of knowledge: Trust in the Internet (*k* = 3)	-.18*	-.20**

** $p < .01$; * $p < .05$; + $p < .10$

Limitations and Future Research

- only self-reports of HIB
  → observational data needed
- homogenous samples, highly educated
  → more diverse samples with regard to age and education needed
- only low to moderate associations of subjective (self-assessed) and objective HIL point to discrepancies between them
  → effects of under-/overestimation of knowledge and skills on HIB („dangerous health literacy“; see Schulz, in prep.)
- Focus on information seeking and basic evaluation
  → what about more complex evaluation/judgement skills?

Types of Information Evaluation

- **two types of information evaluation** (e.g., Wilson, 1993; Bromme et al., 2016)
  - **first hand evaluation“ („What is true?“):**
    - Evaluation of knowledge per se: Logically consistent? Methodologically sound? Consistent with individual experiences/ previous knowledge?
  - **„second hand evaluation“ („Whom to believe?“):**
    - evaluation of source of knowledge & ascription of „cognitive authority“ in specific situations: relevance? trustworthiness? benevolence? (Hendricks, Kienhues, & Bromme, 2016)

How to Conceptualize Critical Health Information Literacy in Laypeople?

- **Health information literate individuals**
  - acknowledge the principle of „division of cognitive labor“ (experts - laypeople; Bromme et al., 2016)
  - have developed advanced (evaluativistic) epistemic beliefs about the complexities and dynamics of medical and health sciences
  - adequately self-assess their abilities to conduct first hand evaluations
  - are able to identify adequate (relevant/trustworthy/ knowledgeable/benevolent) sources for second hand evaluations (e.g. based on formal criteria)
  - stay vigilant to the risk of being misinformed by putative „experts“

Thank you!

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References (1)

Association of College and Research Libraries (ACRL, 2000). *Information literacy competency standards for higher education.* Retrieved from http://www.ala.org/acrl/standards/informationliteracycompetency

Association of College and Research Libraries (ACRL, 2015). *Framework for information literacy for higher education*. Retrieved from http://www.ala.org/acrl/standards/ilframework

Behm, T. (2015). Informationskompetenz und Selbstregulation: Zur Relevanz bereichsspezifischer Selbstwirksamkeitsüberzeugungen In A.-K. Mayer (Ed.), *Informationskompetenz im Hochschulkontext – Interdisziplinäre Forschungsperspektiven* (S. 151-162). Lengerich: Pabst Science Publishers.

Brackett, M. A. & Mayer, J.D. (2003). Convergent, Discriminant, and Incremental Validity of Competing Measures of Emotional Intelligence. *Personality and Social Psychology Bulletin*, *29* (9), 1147-1158.

Brand-Gruwel, S., Wopereis, I. & Walraven, A. (2009). A descriptive model of information problem solving while using internet. *Computers & Education, 53* (4), 1207-1217.

Bromme, R., Kienhues, D. & Stadtler, M. (2016). Die kognitive Arbeitsteilung als Herausforderung der Forschung zu epistemischen Überzeugungen. In A.-K. Mayer & T. Rosman (Hrsg.), *Denken über Wissen und Wissenschaft. Epistemologische Überzeugungen als Gegenstand psychologischer Forschung* (S. 25-38). Lengerich: Pabst Science Publishers

References (2)

Eisenberg, M. B. & Berkowitz, R. E. (1990). *Information Problem Solving: The Big Six Skills Approach to Library & Information Skills Instruction.* Norwood, NJ: Ablex Publishing Corporation.

Freund, P. A. & Kasten, N. (2012). How Smart Do You Think You Are? A Meta-Analysis on the Validity of Self-Estimates of Cognitive Ability. *Psychological Bulletin, 138* (2), 296-321.

Hendriks, F., Kienhues, D., & Bromme, R. (2016). Trust in science and the science of trust. In *Trust and Communication in a Digitized World* (pp. 143-159). Springer International Publishing.

Hofer, B. K. & Pintrich, P. R. (1997). The development of epistemological theories: Beliefs about knowledge and knowing and their relation to learning. *Review of educational research*, *67* (1), 88-140.

Ivanitskaya, L., Boyle, I. O. & Casey, A. M. (2006). Health information literacy and competencies of information age students: results from the interactive online Research Readiness Self-Assessment (RRSA). *Journal of Medical Internet Research, 8 (2*), e6.

Kim, K., Lustria, M. L. A., Burke, D. & Kwon, N. (2007). Predictors of cancer information overload: findings from a national survey. *Information Research*, *12* (4), 12-14.

Kruger, J. & Dunning, D. (1999). Unskilled and unaware of it: how difficulties in recognizing one's own incompetence lead to inflated self-assessments. *Journal of personality and social psychology*, *77* (6), 1121.

Kuhn, D. & Weinstock, M. (2002). *What is epistemological thinking and why does it matter?* Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers.

References (3)

Medical Library Association Task Force on Health Information (2003). *Health information literacy definitions*. Retrieved from http://www.mlanet.org/ resources/healthlit/define.html

Norman, C.D. & Skinner, H.A. (2006). eHealth literacy: Essential skills for consumer health in a networked world. *Journal of Medical Internet Research, 8* (2), e9. doi: 10.2196/jmir.8.2.e9

Niemelä, R., Ek, S., Eriksson-Backa, K. & Huotari, M.L. (2012). A screening tool for assessing everyday health information literacy. *Libri, 62*(2), 125-134.

Nutbeam, D. (2000). Health literacy as a public health goal: a challenge for contemporary health education and communication strategies into the 21st century. *Health Promotion International*, *15* (3), 259-267.

Kruger, J., & Dunning, D. (1999). Unskilled and Unaware of it: How difficulties in recognizing one's own incompetence lead to inflated self-assessments. *Journal of Personality and Social Psychology, 77* (6), 1121-1134.

Rosman, T., Mayer, A.-K. & Krampen, G. (2015). Intelligence, academic self-concept, and information literacy: the role of adequate perceptions of academic ability in the acquisition of knowledge about information searching. *Information Research, 20* (1), Special Supplement, paper isic34.

Soellner, R., Huber, S. & Reder, M. (2014). The concept of eHealth Literacy and its measurement. *Journal of Media Psychology, 26*, 29-38.

References (4)

Sørensen, K., Van den Broucke, S., Fullam, J., Doyle, G., Pelikan, J. M., Slonska, Z. & Brand, H. E. (2012). Consortium Health Literacy Project: Health literacy and public health: a systematic review and integration of definitions and models. *BMC Public Health*, *12*, 80.

Sørensen, K., Van den Broucke, S., Pelikan, J. M., Fullam, J., Doyle, G., Slonska, Z., ... & Brand, H. E. (2013). Measuring health literacy in populations: illuminating the design and development process of the European Health Literacy Survey Questionnaire (HLS-EU-Q). *BMC Public Health, 13* (1), 948.

Steckelberg, A., Huelfenhaus, C., Kasper, J., Rost, J. & Mühlhauser, I. (2009). How to measure critical health competences: Development and validation of the Critical Health Competence Test (CHC Test). *Advances in Health Sciences Education: Theory and Practice, 14*(1), 11-22. doi:10.1007/s10459-007-9083-1.

Wilson, P. (1983). *Second-hand knowledge: An inquiry into cognitive authority.* Westport, CT: Greenwood Press.

Wilson, T.D. (2001). Information overload: implications for healthcare services. *Health Informatics Journal*, *7*, 112-117.

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