

The Importance of Teaching about



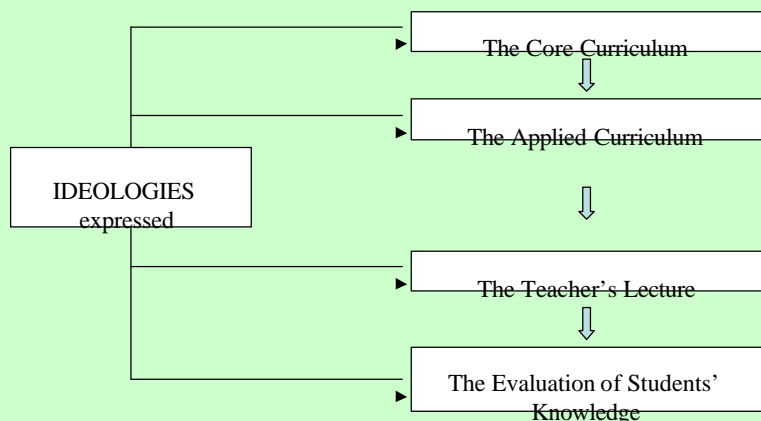
Critical Thinking and Epistemologies



Exploring Health Science Students' and Professionals' Attitudes Towards Complementary-Alternative Medicine

Sverre Pettersen
Akershus University College
Lillestrom, Norway

The Influence of *Ideologies* in Education



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Critical Thinking

Critical thinking is deciding rationally what to or what not to believe (Norris S, 1985)

The intellectually disciplined process of activity and skillfully conceptualizing, applying analyzing, synthesizing or evaluating information gathered from, or generated by, observation, reflection, experience, reasoning or communication as a guide to belief and action. (Paul R, 1993).




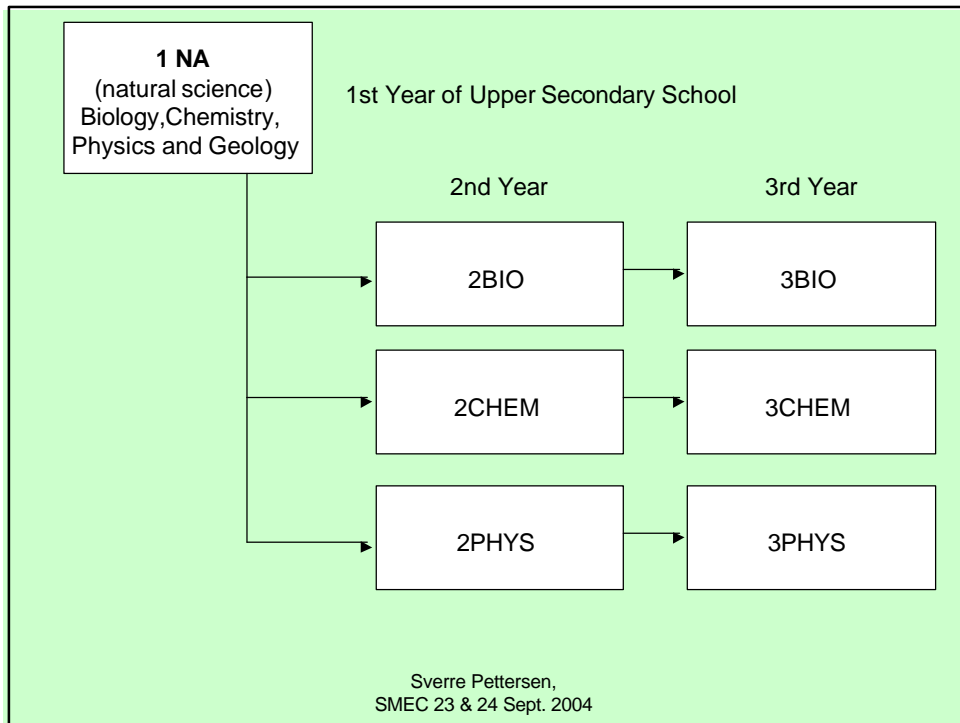
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Epistemology


- the philosophical theory of *knowledge*
- the branch of philosophy that deals with the nature, origin and scope of *knowledge*
- is the study of *what* and *how* humans know: its origins, nature, methods, and limits



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Teaching about
Critical Thinking
and
Epistemology
in
Upper Secondary School
Biology Courses
in
Norway?



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-In the teaching of biology, emphasis must be placed on a scientific approach and the use of biological working methods must play a central role in teaching the subject.....

-One characteristic feature of biology is that accepted biological knowledge is constantly being challenged by new research findings.

-A historical perspective on the subject is therefore important, because the established truth has always changed with the acquisition of further knowledge.

(Curriculum for Upper Secondary Education: Biology, 1996, 2)



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Some Common objectives for Biology Education: 2nd and 3rd year courses in Upper Secondary School (2BIO and 3BIO)

Pupils shall:

- be able to make systematic observations and use biological methods in the field and in the laboratory
- be able to draw on biological theory to interpret their observations
- be able to design their own investigations, process data, and present and evaluate methods, possible sources of error and results
- be familiar with some elements of the history of biology and understand the impact biological knowledge has had on the development of our society

(Curriculum for Upper Secondary Education: Biology, 1996, 4)

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Method I

Questionnaire

(Likert scaled: 1-5)

Teachers of 2nd level Biology (2BIO): N = 53

Teachers of 3rd level Biology (3BIO): N = 50

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Biology teachers emphasis on teaching about critical thinking and epistemology

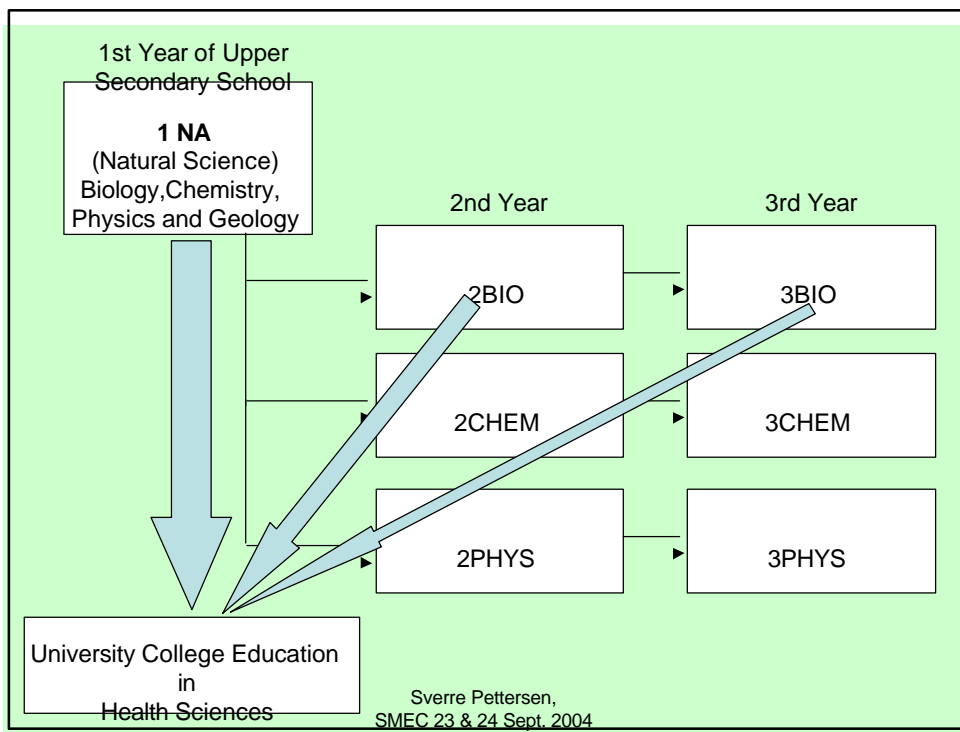
Questions	2BIO teachers			3BIO teachers			
	(N =)	-	±	+	(N =)	-	±
To what extent have you taught the students about topics that might increase their ability to perform critical evaluation of biological claims – for instance claims of health improvement and environmental damage?	15	46	39	9	34	57	
How strongly do you “agree” or “disagree” to the following statement: “Teaching students about critical thinking is the 2BIO/3BIO-teacher’s business.”	5	11	84	12	9	79	
To what extent have you taught the students about the scientific standards of validity (the documentation requirements) concerning the knowledge presented in biology text-books?	26	41	33	28	44	28	

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Biology teachers emphasis on teaching about critical thinking and epistemology

Questions	2BIO teachers (N =)			3BIO teachers (N =)		
	-	±	+	-	±	+
	To what extent have you taught the 2BIO/3BIO-students <i>about</i> complementary-alternative medicine (CAM)?	69	31	0	71	26
In your biology teaching, to what extent have you compared the validity standards of the knowledge presented in biology text-books with the validity standards of CAM?	56	26	18	61	28	11
To what extent have you discussed health claims in the media with your 2BIO/3BIO-students?	21	63	16	23	54	23

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The research questions

- What are the Health Science-students', their Philosophy of Science/Research Methods and Biological Science teachers', and the dieticians' *attitudes* towards the use of 15 common CAM treatments?
- What are the *predictors* of Health Science students', their Philosophy of Science/Research Methods and Biological Science teachers', and dieticians' *positive* attitude towards the use of 15 common CAM treatments?

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Method II Questionnaires

(Likert scaled: 1-5)



- Health Science Students (HS)

- Nursing (n = 317)
- Physiotherapy (n = 63)
- Social Educator (n = 59)
- Radiography (n = 34)

▶ (N = 473)

- Health Science teachers

- The Philosophy of Science/
Research Methods (Phil.) ▶ (N = 47)
- The Biological Sciences (Biol.) ▶ (N = 59)

- Dieticians

▶ (N = 117)

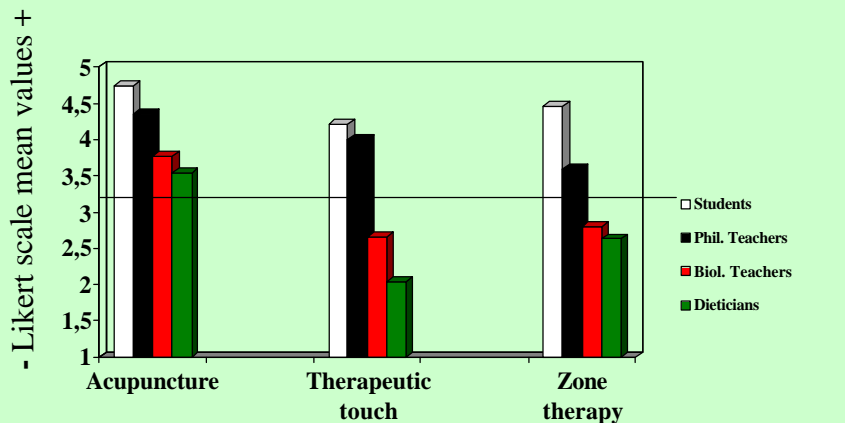
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The 15 CAM treatments

Construct name	Measurement	Content
CAM_att (dependent variable)	Attitudes towards the use of CAM	<ul style="list-style-type: none"> - Acupuncture - Therapeutic touch - Zone therapy - Light therapy - Homeopathy - Aroma therapy - Herbs - Kinesiology - Osteopathy - Magnet therapy - Hydrotherapy of the colon - Mega-vitamin doses - Color therapy - Healing - Prayer, faith

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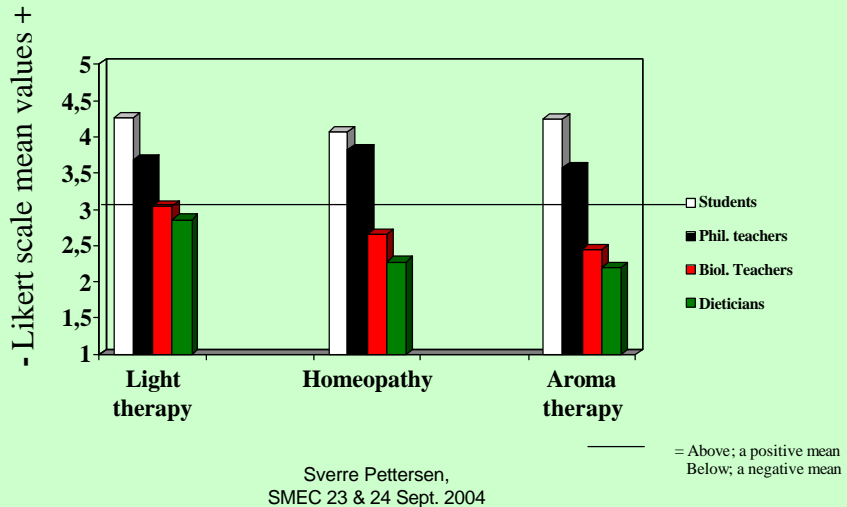
The four groups' mean attitudes towards the *use of* CAM treatments (1)



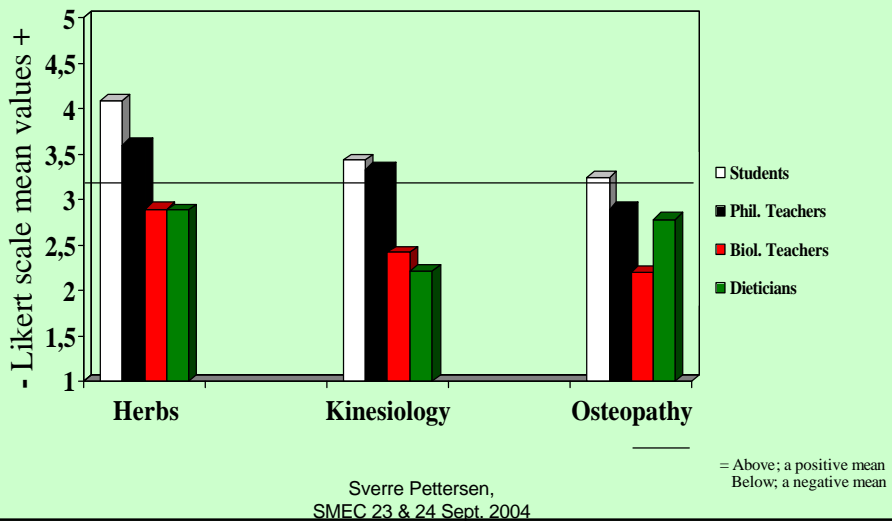
= Above; a positive mean
Below; a negative mean

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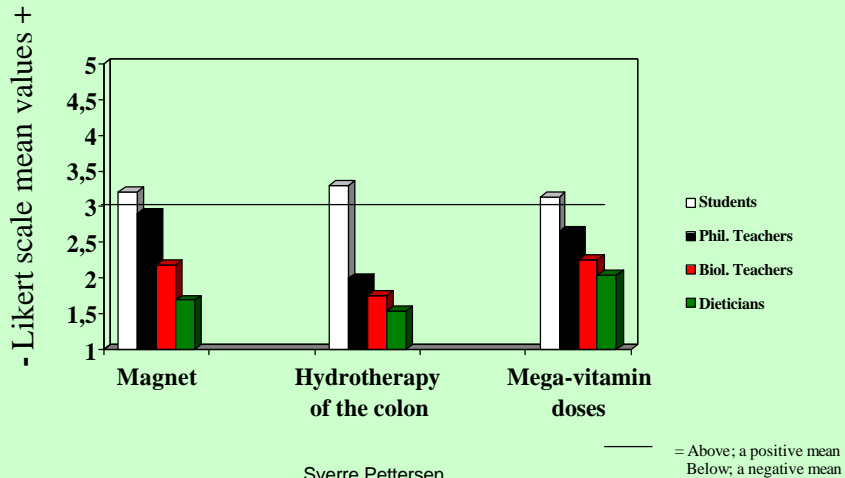
The four groups' mean attitudes towards the *use of* CAM treatments (2)



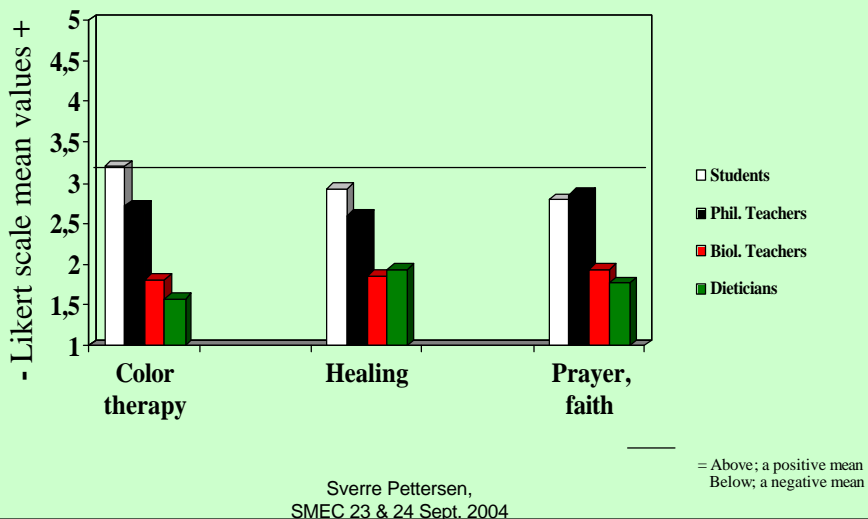
The four groups' mean attitudes towards the *use of* CAM treatments (3)



The four groups' mean attitudes towards the *use of* CAM treatments (4)



The four groups' mean attitudes towards the *use of* CAM treatments (5)

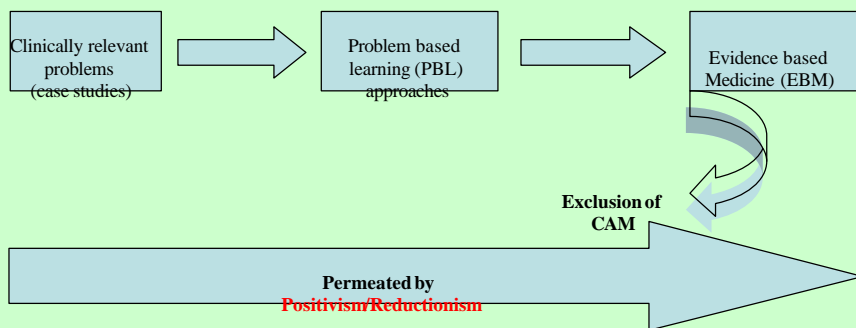


Summery

- The Health Science students and their Philosophy of Science teachers were quite *concurrently positive* towards several of these CAM treatments, while the Biological Science teachers and the dieticians, were *not* as positive.

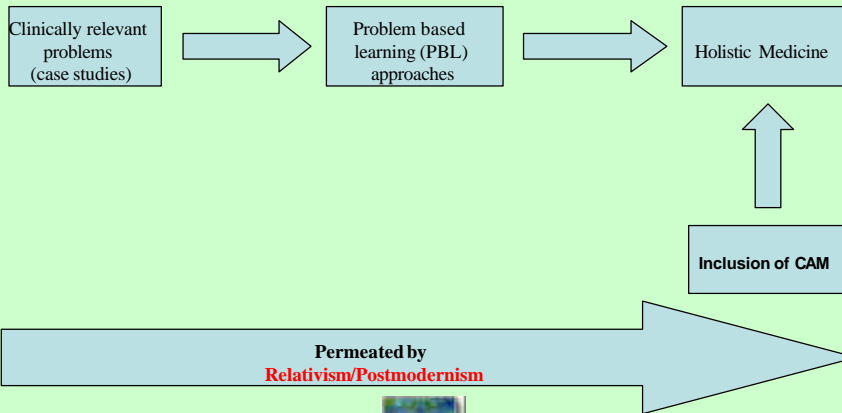
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Exclusion of CAM



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Inclusion of CAM



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The significant ($p < .05$) predictors of Health Science Students' positive attitudes towards the use of CAM

Construct name and (Mean \pm S.D.)	Measurement	Contents
Para_bel (2.04 \pm 0.55)	Beliefs in Paranormal phenomena	<ul style="list-style-type: none"> - Prophecies - Star sign - Horoscope - Mascot - Seances - Ghosts - Clairvoyance - Mental contact with the dead - Telepathy
CAM_incl (3.34 \pm 0.79)	The willingness to include student teaching of CAM	<ul style="list-style-type: none"> - In health science education, CAM should be taught to the students - The teachers of health science education should be more receptive to include CAM in their teaching - CAM should be incorporated in the curriculum

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The significant ($p < .05$) predictors of Phil.- teachers' positive attitudes towards the use of CAM

Construct name (Mean \pm S.D.)	Measurement	Contents
CAM_incl (3.13 \pm 0.85)	The willingness to include student teaching of CAM	<ul style="list-style-type: none"> - In health science education, CAM should be taught to the students - The administrators of health science education should be more receptive to include CAM in their teaching - CAM should be incorporated in the curriculum

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The significant ($p < .05$) predictors of Dieticians' positive attitudes towards the use of CAM

Construct name (Mean \pm S.D.)	Measurement	Contents
CAM_more (1.83 \pm 0.73)	The willingness to learn <i>more</i> about the 15 CAMs	<ul style="list-style-type: none"> - The 15 CAM treatments
CAM_adv (2.54 \pm 0.80)	CAM advise in dietary counselling	<ul style="list-style-type: none"> - I am positive towards the use of CAM in dietary counselling - My clients should use CAM to increase the effects of diets.
CAM_red (2.79 \pm 0.96)	The nutritional education should be more "holistic"	<ul style="list-style-type: none"> - The ideology of nutritional education should be more holistic - The nutritional education is too much influenced by reductionism

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The "Nature of Science" (NOS)

- how the body of public knowledge called science has been established and is added to
- what our grounds are for considering it reliable knowledge
- how the agreement which characterizes much of science is maintained (Driver et al. 1996).

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Learning/Teaching about topics connected to "The Nature of Science" (NOS)?

Statements	HS- Students (N = 473)	Phil.- teachers (N = 47)	Biol.- teachers (N = 59)
	%		
	"To a large extent"		
that scientists often present different views and models of how to solve a problem	37	34	38
how to judge the academic qualification of authors, who claim to be researchers	35	22	37
that scientist and scientific research projects are not value-free	21	35	22
that the recent scientific research results are not immediately accepted as "facts" by the scientific community	27	31	31
that scientists often speak of the recent research findings with some reservation	31	16	25

The News Brief Assessment Test (1-2)

(Pettersen & Solberg, 2003)

DRUG AGAINST SMOKING

Nicotinend is an important drug, which makes you quit smoking.

American scientists have reported that the use of a new drug called Nicotinend, has stopped the urge for cigarettes among health professionals. Lately, the numbers of smokers in this group have largely increased. The Council of Tobacco Health Problems has hailed this important research finding.

HIGH VOLTAGE POWER LINES CAUSE LEUKAEMIA

Living close to high voltage power lines (HVPL) is an important cause of child leukaemia.

Norwegian scientists have recently reported that children living close to HVPL have higher risk of developing leukaemia than others living far away from such lines. In sub-urban areas, where HVPL have been put up, the number of child leukaemia incidents, are shown to increase. The Leukaemia Children Parents' Organization has hailed this important research finding.

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The News Brief Assessment Test (3-4)

(Pettersen & Solberg, 2003)

THERAPEUTIC TOUCH RELIEVES PAIN

Using Therapeutic Touch is an important treatment of migraine.

British scientists have reported that people suffering from migraine receiving the Therapeutic Touch treatment experienced a noticeable pain relief. Intensive and durational headache are problematic for these people. The Migraine Association has hailed this important research finding.

PHYSICAL TRAINING CUTS BACK ON MEDICATION

To reduce the amount of drugs used by people suffering from manic depression, physical training is important.

Swedish scientists have reported that regular physical training could reduce manic depression people's need for medication. Lately, the extensive drug consume in this group of people, has been of great concern to the national mental health authorities. The Mental Illnesses Research Support Association has hailed this important research finding.

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What were the students asked to do about these (fictitious) news briefs?

Suppose that the **conclusion** (in **bold** letters) is very important to you and that you must determine whether it is true. What additional pieces of *information*, if any, would you like to have about the researchers' report to decide whether this **conclusion** is correct? Please list each point you make separately.

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The Hierarchical Taxonomy for classifying questions and ~~knowledge about scientific research (Korpan et al. 1994).~~

Topic Code	Description
Categories	
<i>Social Context</i>	Information about the prestige and bias related to <i>who</i> did the research or funded it and <i>where</i> it was conducted or published
<i>Theory/Agent</i>	Information about <i>why</i> the reported effects might have occurred, including questions about the properties of the putative causal agent and/or possible underlying mechanisms
<i>Method</i>	Information about how the research was conducted, including such topics as research design and procedures
<i>Data/Statistics</i>	Information about precisely <i>what</i> was observed in the reported study or about statistical tests
<i>Related Research</i>	Information about whether the findings have been replicated or fit other results
<i>Relevance</i>	Information about the importance or applicability of the findings

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The percentage of students (N = 473) requesting between 0-6 scientific topic code categories to each of the four fictitious News Briefs (Pettersen & Solberg, 2003).

-----FICTITIOUS NEWS BRIEFS-----

The Number of Scientific Topic Code Category Requests	<i>Quit smoking</i> (%)	<i>High Voltage Power Lines</i> (%)	<i>Therapeutic Touch</i> (%)	<i>Physical Training</i> (%)
0	33	34	43	47
1	28	33	29	29
2	23	21	19	17
3	13	10	7	7
4	3	2	2	0
5	0	0	0	0
6	0	0	0	0

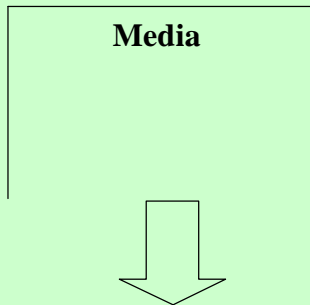
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Teaching implications

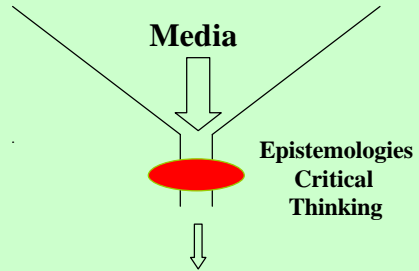
- To make pupils in upper secondary school capable of evaluating media health claims, critically (as part of their *literacy* skills), teaching about epistemologies, critical thinking, and the “nature of science” might be useful.
- Teaching pupils about of the epistemology differences existing between medical science and CAM could be an effective approach to reach the superior goals of upper secondary school biology education (1NA, 2BIO and 3BIO).
- For students of a dominantly scientific evidence-based University College Health Science Education, classroom discussions of CAM-claims in an epistemology, critical thinking and “nature of science” perspective, is probably necessary.

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Knowledge of Epistemologies and application of Critical Thinking skills to "filter" health claims



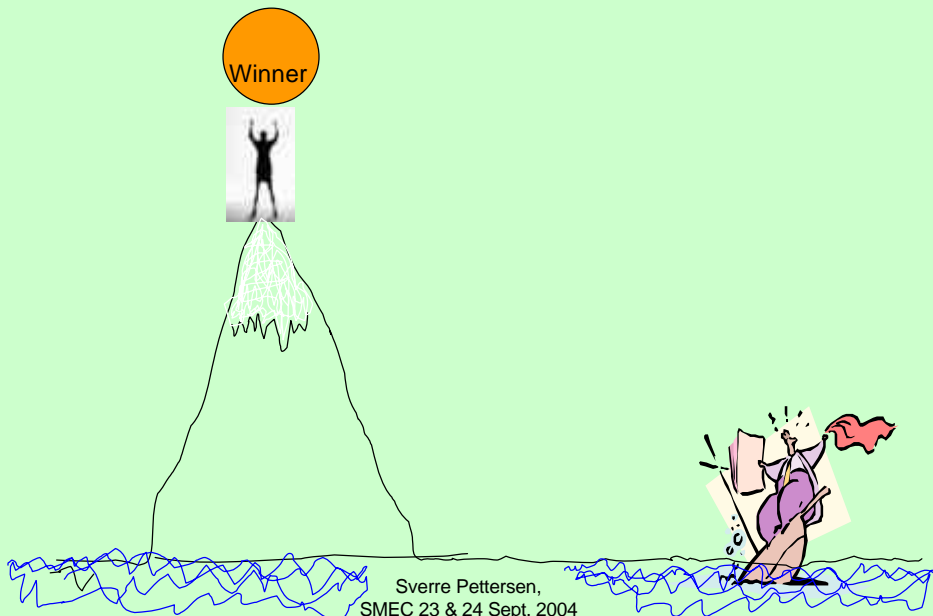
Free flow of health news



Internalisation of critically evaluated health messages

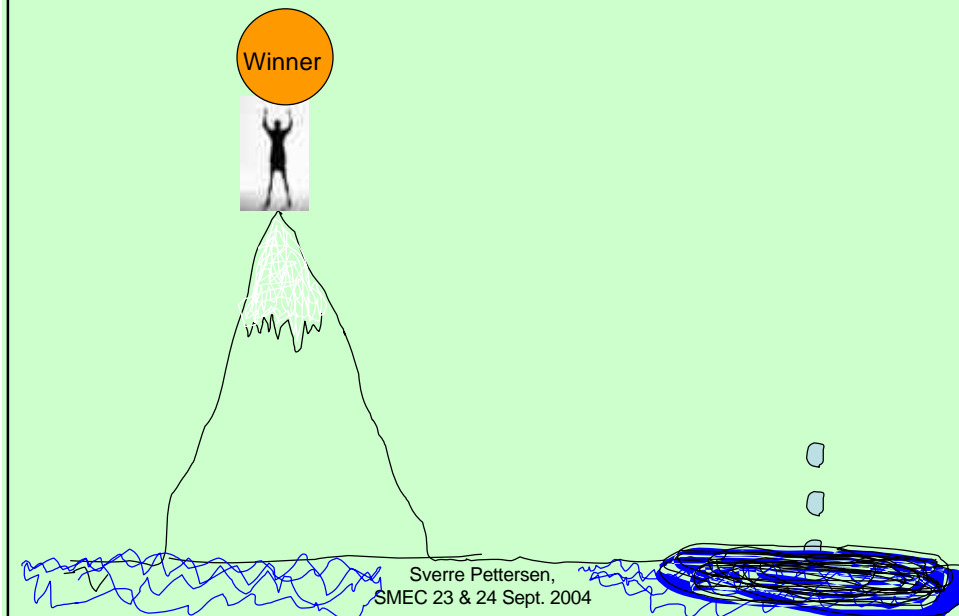
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Inducing a *life quality gap*?



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Inducing a *life quality* gap?



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sverre.pettersen@hiak.no