Knowledge Acquisition and Opinion Formation at the Science Museum: The Role of a Media Terminal to Support Elaboration on Controversial Issues

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Theoretical Background

In addressing current socio-scientific issues, science museums are challenged to present the ambiguity and ambivalence of these topics and to support visitors' reflective and critical thinking (Halpern, 1989). In this project, a media terminal was designed to mediate and encourage elaboration on and opinion exchange about the topic nanotechnology (NT).

It is assumed that salience of controversial information (Rosenberg, 1956), and opportunity to express one's own opinion (Petty & Cacioppo, 1986) are crucial factors for both learning and opinion formation.

Research Question

1. Does expression of one's own opinion about NT foster deep elaboration of the exhibition content?

2. Is salience of arguments necessary for formation of well-founded opinions about controversial issues like NT?

Methodology

A "virtual museum" about nanotechnology (NT; fig. 1) was used as 'learning material'. It presents both facts and expert statements which comprise different arguments both in favour of and against NT.

Fig. 1: Virtual exhibition "Nanodialogue"

After exploration of the exhibition, participants are randomly assigned to four conditions (see tab. 1, and fig. 2). Altogether, 60 students participated in this study.

Table 1: Experimental design

Salience of arguments	Active expression of opinion	
	no	*yes*
no	Nano-Quiz (1)	Overall rating and statement (3)
yes	Expert Statements-Quiz (2)	Expert statements- and overall-rating plus statement (4)

The control group works on a quiz which asks for facts about NT (1). In condition of salience of arguments but without expression of their own opinion, participants assign eight statements to corresponding experts by drag & drop (2; fig. 2). A second group rates NT in general as either "I am in favour of NT" or "I am against NT" on a rating scale and writes a short statement indicating their opinion about NT (3, fig. 3). The third group additionally evaluates eight expert statements by 'agreement' and 'relevance' by means of a rating scale before rating NT in general (4).

Figure 2: Expert statement rating, and overall rating with statement.

Ss then write a summary about NT including all arguments they remember (argument repertoire) and their own opinion as a free statement (opinion quality). Ss' attitudes towards nanotechnology are assessed. A knowledge test assessed factual knowledge gained.

Preliminary Results

For factual knowledge, an ANOVA revealed no differences among the conditions (F=1,087, p=.362).

However, for attitude relevant knowledge, i.e. argument repertoire, a MANOVA revealed significant differences regarding quantity of remembered *con* arguments (p<.01) and regarding number of areas of application of NT recalled (p<.05; fig. 3).

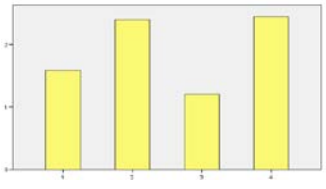

Fig. 3: mean of application areas remembered per condition

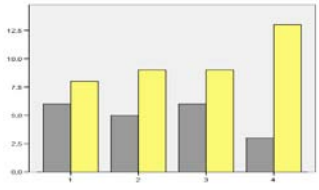

Fig. 4: awareness of controversy (grey= no, yellow = yes) per condition

Ss of condition 4 showed more awareness of controversy in their essays about NT compared to Ss of all other conditions (fig. 4).

Conclusion

In general, this first study could show that active expression of opinion about a current and controversial scientific topic can enhance knowledge acquisition and opinion formation. However, salience of arguments seems to be crucial for the integration of controversial information and formation of well-founded opinions.

Results of this study might improve design proposals for innovative "dialogue"- and "opinion"-terminals at Science Museums.