

Impact of goal-orientation on group learning in informal settings.

Eva Mayr (Virtual Ph.D. Program, University of Tuebingen)¹

Advisors:

Prof. Dr. Dr. Friedrich W. Hesse (University of Tuebingen, Knowledge Media Research Center)

Prof. Dr. Hans Spada (University of Freiburg)

Abstract

Informal and formal learning environments are different in many ways, for example on the dimension of goal-orientation: In a formal setting, like a school, goals are externally set by a teacher, whereas in a museum they have to be generated internally by the visitor himself. The problem addressed in this PhD project is that many visitors do not have any learning goals when visiting a museum. It is assumed that learning goals in a museum – as in formal settings – structure which information is selected, how it is elaborated (cognitive processing, conversation) and finally what is learned. Therefore learning goals can be regarded as beneficial for learning in museums. A first experimental study is conducted to support the benefits of internal (condition 1) and external (condition 2) learning goals on learning in informal settings in contrast to visiting without goals (control condition). In a second step two media applications are designed to enhance goal-orientation in a museum: An adaptive virtual museum and a location-sensitive adaptive PDA. Visitors are provided with information according to their learning goal, which should further enhance learning gains in a museum. To encourage the explication of learning goals is a practical way to promote learning in museums and can be easily implemented. Further methodological questions are on the comparability of a virtual and a real museum and on the role of experimental laboratory studies for studying informal learning. (231 words)

Overview

Theoretical Background

Learning in museums has become a research field of increasing interest in the social sciences in the last decade (Dierking, Ellenbogen, & Falk, 2004). In this study two features of a museum visit are regarded as important: The social situation (Allen, 2002; Falk, 2004; Galani & Chalmers, 2004) and the prevalent absence of learning goals (Black, 2005).

Most visitors come to museums in groups (Black, 2005). Interaction with other visitors, conversational elaboration (Allen, 2002; Leinhardt & Crowley, 1998, 2002), and social navigation (Höök, 2003) therefore influence the museum visit and learning in museums.

The importance of goals can be inferred from theories of self-regulation (Boekarts & Minnaert, 1999) and information processing (ACT-R, Anderson et al., 2004). Learning goals in museums can be assumed to affect all stages of information processing (see fig. 1). Goals are especially powerful when they are of internal origin and conscious and therefore available in working memory (Austin & Vancouver, 1996).

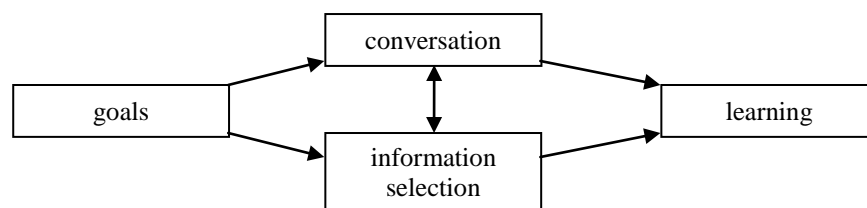


Figure 1. Impact of goals on information processing and learning at a museum.

Media Application

As informal learning settings are unstructured and as goals and ways of information processing vary between persons to a great extent, media applications are a powerful way to meet the requirement of adaptivity. Two

¹ Contact information:

Konrad-Adenauer-Str. 40

72072 Tuebingen (Germany)

Email: e.mayr@iwm-kmrc.de

Phone: +49 / 7071 / 979 – 322, Fax: +49 / 7071 / 979 - 300

different applications are possible: Adaptive virtual museums and a location-sensitive, adaptive PDA for real museums, which both provide visitors with information according to their learning goal.

Research questions

1. In which way do learning goals of external or internal origin influence information selection, conversational elaboration and learning? Assumption: internal > external > no goal.
2. Are learning goals of similar importance in a virtual and a real museum? Assumption: virtual = real.
3. Can results from a laboratory museum be compared to studies in a real museum? Assumption: Partially.

Methodology

To control as many factors as possible, laboratory experiments will be conducted first: In a virtual museum context and with a laboratory exhibition (“Nanodialogue”) from the Deutsches Museum (Munich, Germany). By comparing the laboratory and the virtual museum study knowledge is gained about differences in goal-oriented learning in real-life and virtual informal settings. Comparisons to a field study in the real exhibition will validate results from the laboratory studies.

There are two experimental conditions and one control condition in all studies (see Table 1): The *control group* receives only information about exhibits. Additionally, in the *external learning goal condition* visitors are provided with a set of external learning goals before they explore the exhibition, from which they are encouraged to choose one. It is assumed that visitors select from these goals those that are most congruent with their own goals. In the *internal learning goal condition* visitors are made aware of their own goals by asking them to explicate their plans for the exhibition. Comparisons between these experimental conditions will provide insight into the influence of different kinds of goal-orientation on information selection, conversational elaboration and knowledge acquisition in informal learning.

Table 1: Research design.

		Goal condition		
		Control group	External learning goal	Internal learning goal
Context condition	Laboratory museum	20 Dyads	20 Dyads	20 Dyads
	Virtual museum	20 Dyads	20 Dyads	20 Dyads
	Real Museum	20 Dyads	20 Dyads	20 Dyads

In the laboratory museum and the real museum study visitor dyads will be provided with one PDA, in the virtual museum study visitor dyads will be placed in front of one computer, so that they are forced to navigate as a team. After an exhibition exploration phase dyads will be asked to answer some questions individually on use of the media application, learning gains, internal goals, general museum visiting behaviour, as well as on prior knowledge and interest.

Learning in all studies will be operationalised in the same way: Exhibition exploration will be traced (by the PDA’s location system or logfiles) and provide data on the selection of exhibits, the time spent at exhibits, and overall visiting time. Visitors’ dialogues will be recorded and analysed with respect to goal and information selection, information evaluation, and conversational elaboration. At the end of the visit knowledge acquisition is measured in a questionnaire. To find out about deeper learning processes, a post-visit survey will be conducted some month after the experiment to measure long-term memory of the information and the visit in general. (647 words)

Issues to discuss during the consortium

With respect to the research design it was a great challenge to find ways of conducting informal learning studies in a formal laboratory setting: It is missing many characteristics of informal learning settings (e.g. intrinsic motivation, free-choice learning, and plurality of exhibits) and therefore cannot be regarded as fully adequate. My way out is repeating the laboratory studies in the field in a real museum and trying to hold the laboratory setting as informal as possible (e.g. taking a real exhibition into the laboratory, giving as little constraints as possible, ...). As I am not fully satisfied with this design, it would be interesting to get other ideas how to handle the assessment problem in informal settings. Do you think that the virtual and the laboratory museum are comparable and adequate for doing research on informal learning? Especially your opinions on the generalisation of data gained by these

methodological approaches would be of interest: Are such laboratory settings suitable to gain externally valid results?

The experimental manipulation is another issue of discussion: I will ask visitors about their plans (What do you want to get to know?) for the exhibition in the internal learning goal condition. Do you think this is an adequate way to make visitors' internal goals explicit? Are there other ideas how this process could be handled? In the external learning goal condition visitors will be made aware of prior visitors' learning experiences in this exhibition – I am unsure whether visitors are going to internalise the goal most appropriate for them and this is able to structure their visit. As they have to choose one goal, it is made explicit, but is this goal strong enough to guide the visitor? If it is, there will not be any difference between the two experimental conditions any more. Therefore I am unsure whether a third experimental condition is needed, in which visitors are provided with an external, more directive goal (“Find everything out about...”) like in formal settings. The benefits from such a condition would be a clearer contrast between informal and formal learning settings.

As to the analysis a problem is the assessment of elaboration on information: Different observational measures of the visiting process could be used, e.g. time spent at the object (cut-off-score, intraindividual higher-than-average-time in exhibition, interindividual higher-than-average-time at exhibit), conversation, eye-gaze ..., but can they be regarded as adequate for measuring deep information processing? To measure the outcome, a knowledge test – similar to those used in formal learning settings – may not be adequate for informal settings, as learning in informal settings cannot be controlled and is therefore very heterogeneously. I am thinking about using open questions (not on facts but on a higher level, e.g. “Which influence is nanotechnology going to have on society?”), which then could be categorised according to the exhibits visited and to the usage of references to goals and prior knowledge.

Another unsolved question regards the planned second wave of research, when adaptive information should be presented to the visitor: Depending on an individual goal a visitor shall be presented information to the exhibits. Can a mobile media application be developed, which presents information according to the visitor's INTERNAL goals? This would request a highly flexible solution, e.g. metadata attached to each object, automatic semantic analysis of the goals and the adaptive generation of a visiting route. But maybe there are easier ways? (564 words)

References

- Allen, S. (2002). Looking for learning in visitor talk: A methodological exploration. In G. Leinhardt, K. Crowley, & K. Knutson (Eds.), *Learning conversations in museums* (pp. 259-303). Mahwah, NJ: Lawrence Erlbaum Associates.
- Anderson, J. R., Bothell, D., Byrne, M. D., Douglass, S., Lebiere, C., & Qin, Y. (2004). An integrated theory of the mind. *Psychological Review*, *111*, 1036-1060.
- Austin, J. T., & Vancouver, J. B. (1996). Goal constructs in psychology: Structure, process and content. *Psychological Bulletin*, *120*, 338-375.
- Black, G. (2005). *The engaging museum*. London: Routledge.
- Boekarts, M., & Minnaert, A. (1999). Self-regulation with respect to informal learning. *International Journal of Educational Research*, *31*, 533-544.
- Dierking, L. D., Ellenbogen, K. M., & Falk, J. H. (2004). In principle, in practice: Perspectives on a decade of museum learning research (1994-2004). *Science Education*, *88*, 1-3.
- Falk, J. (2004). The director's cut: Toward an improved understanding of learning from museums. *Science Education*, *88*, 83-96.
- Galani, A., & Chalmers, M. (2004). *Empowering the remote visitor: Supporting social museum experiences among local and remote visitors*. Proceedings of the 2nd International Conference of Museology (ICM), Mytiline, Greece.
- Höök, K. (2003). Social navigation: from the web to the mobile. In G. Szwillus, & J. Ziegler (Eds.), *Mensch & Computer 2003: Interaktion in Bewegung* (pp. 17-20). Stuttgart: B. G. Teubner.
- Leinhardt, G., & Crowley, K. (1998). *Museum learning as conversational elaboration: A proposal to capture, code and analyze museum talk*. Museum Learning Collaborative Technical Report MLC-01. Retrieved December 1st, 2005, from <http://museumlearning.com/mlc-01.pdf>.
- Leinhardt, G., & Crowley, K. (2002). Objects of learning, objects of talk: Changing minds in museums. In S. Paris (Ed.), *Perspectives on object-centered learning in museums* (pp. 301-324). Mahwah, NJ: Lawrence Erlbaum Associates.