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MUSEOGRAPHIC TRANSPOSITION: ACCOMPLISHMENTS AND APPLICATIONS

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Abstract. L'idée de transposition didactique se pose dans la recherche sur l'enseignement des sciences dans les contextes scolaires, mais il a intérêt aussi à des contextes d'apprentissage informels comme les musées. Durant la dernière décennie, des chercheurs du musée ont utilisé le cadre de la transposition muséographique pour étudier comment les expositions dans les musées sont créés. Le cadre a progressivement développé dans trois directions qui mettent l'accent sur l'épistémologie, la sémiotique et la sociologie, respectivement. Nous passons en revue les travaux existants sur la transposition muséographique pour illustrer ces trois directions et de discuter les mérites de chacun d'eux.

Abstract. La idea de transposición didáctica se origina dentro del área de investigación educativa en ciencias, en el contexto escolar, pero tiene tambien relevancia en contextos informales de educación, como museos. En la década pasada investigadores de museos usaron como base la transposición museográfica para estudiar la forma en que las exposiciones eran creadas. Esta base teórica se ha ido desarrollando, gradualmente, en tres abordajes enfocados en la espistemología, la semiótica y la sociología, respectivamente. Hacemos, aquí, una revisión de los trabajos existentes en el área de transposición museográfica, para ilustrar estos tres abordajes y para discutrir los méritos de cada uno de ellos.

Abstract. The idea of didactical transposition arose in science education research in school contexts, but has relevance also to informal learning contexts such as museums. In the past decade, museum researchers have used the framework of museographic transposition to study how museum exhibitions are created. The framework has gradually developed in three directions which focus on epistemology, semiotics, and sociology, respectively. We review the existing work on museographic transposition to illustrate these three directions and to discuss the merits of each of them.

1 Introduction: Why study knowledge transformation in museums?

In research on formal science education, the theoretical idea of didactical transposition originally arose as a response to the inability of psychology to adequately address the practical problems of teaching and learning, and a resulting focus on knowledge as the variable of interest in educational systems (Chevallard, 2007). The main thrust of the notion of didactical transposition is that the knowledge developed by scientists in their research undertakings rarely maps exactly onto the design parameters in terms of which practical teaching action has to be planned. As a result, for

science to articulate with practice, a deconstruction and reconstruction of the knowledge in question is required (Layton et al., 1993). Accordingly, knowledge was seen not as having a definite and 'true' substance, but as something that is constructed, transformed, and *transposed*. Didactical transposition deals with the trajectory of knowledge in a process of making it teachable, and includes questions such as: Where does the knowledge come from? How, and by who is it shaped? What is its degree of effectiveness in promoting learning? (Chevallard, 2007).

Questions such as these are relevant also in informal science education contexts such as museums, science centres, zoos, etc. (in the following designated simply as 'museums'). Museums define themselves as places of learning (eg. Exploratorium, 2006; Experimentarium, 2002) and just as in formal science education contexts, museums create teaching environments, mainly exhibitions, on the basis of certain bodies of scientific knowledge which they wish to mediate to their visitors. It could even be argued that the didactical transposition that takes place in a museum context is *more critical* than that which takes place in a formal education context because one of the most important products of the transposition in a museum – the exhibition – is usually relatively static while the product of transposition in a school context may be continuously adjusted by the teacher according to the needs of the learners.

Accordingly, we argue that the study of the didactical transposition that takes place in museums is a necessary and worthwhile undertaking if we as researchers are to produce results than can improve teaching practices (i.e. exhibition development practices) in a way that can potentially affect the learning outcomes of these environments. In the following, we review the studies that have applied the notion of didactical transposition to informal education contexts in order to draw out two main lines of research which we feel are fruitful. We then proceed to outline some interesting perspectives of this work.

2 The museum as an educational place

As informal education spaces, museums promote and organize many kinds of activities and events for a diverse audience with the purpose of increasing and improving scientific culture and literacy (Lucas, 1991; Bradburne, 1998; Beetlestone et al., 1998). The educational activities that take place in the museum are characterized by their relationship to the elements *space, time* and *objects* (Van-Praët and Poucet, 1992). The exhibition is the primary medium for the educational endeavors of museums and is typically the result of the work of many teams involving professionals from many areas of knowledge (scientists, museologists, educators, communicators, designers, artists, etc). Through exhibitions, it is possible for visitors to learn concepts, participate in activities, experience moments of fruition, contemplation, leisure and, accordingly, it is important to understand that the narrative proposed by them is a fundamental step towards the fulfillment of education and scientific public communication objectives in museums.

The characteristics of exhibitions have been widely studied (Dean, 1994; Davallon, 1999; Schärer, 1999). Davallon (1988) presents the challenges of exhibition development by considering it a process in which representation occurs when the scientific discourse (the source knowledge) is transformed to the vulgarisation discourse (the target knowledge). He analyses this representation process using a semiotic interpretation which considers the dimension of *space* in which the

vulgarisation occurs. He suggests that the vulgarisation in the production of an exhibition is not merely a translation process, but a transformation one. In this transformation of the source-text into a target-text, another *object* is produced – the exhibition.

Ramos (2004) affirms that exhibiting something is to make it viewable by removing it from its original location. He says that displaying an object is *topography violence*, an act of taking the object from its place of use and conferring to it a dimension of spectacle. Exhibiting, to him, is an exercise of relocating the object.

In our work we focus on understanding and analysing this transformation process, both in epistemological and museographical way, in the production of an exhibition. The concept of didactical transposition and, specifically, museographic transposition, is our primary theoretical tool to study the production of exhibitions in museum.

3 The development of the model of museographic transposition

Despite being known in formal science education contexts since the seventies, the didactical transposition framework was first seen in an informal science education context in the mid-nineties. Early applications of the framework mainly took the form of the acknowledgement of the existence of a knowledge transposition. This was the case, for example, in a study by Allard et al. (1996) where the authors acknowledged the occurrence of a tacit knowledge transposition in the discourse produced by museum guides, and argued for improving this discourse by making the transposition deliberate and adapting it to the cognitive abilities of the learners in the target group. Allard and colleagues thus advocated the prescriptive model of transposition shown in Figure 1A.

The term *museographic transposition* was coined about a year later by Simonneaux and Jacobi (1997). Just as didactical transposition is the transformation that occurs during the process of creating taught knowledge from scientific knowledge[i], museographic transposition was defined as the transformation of scientific knowledge into knowledge taught in an exhibition (Simonneaux & Jacobi, 1997). The term *museographic* refers to the visual presentation form proper to the museum, i.e. the exhibition, which may consist of a range of objects and three-dimensional models as well as illustrations and text. The authors, however, limited their discussion mainly to the transposition of knowledge as text and the linguistic choices made in this transposition.

In their study, Simonneaux and Jacobi (1997) investigated the museographic transposition of an object of knowledge from the field of biotechnology. The point of departure was an object of biotechnological knowledge and its articulation in scientific journals. The 'taught knowledge' was the museographic manifestation of this knowledge in a series of exhibition posters consisting of text and photos. The study thus assumes a single transposition process from the reference knowledge in the scientific discourse to the knowledge expressed the exhibition milieu (Figure 1B) but emphasise the importance of avoiding the dogmatisation of knowledge by transposing not only the scientific knowledge itself but also the characteristics of the origin of this knowledge (cf. Astolfi et al., 1997). The transposition model implicitly advocated by Simonneaux and Jacobi (1997) (Figure 1B) is accordingly one that includes the context and social setting of a given object of knowledge.

The full implication of the term *museographic* transposition was appreciated by Asensio and Pol (1999) when they addressed the complexity of museum exhibitions by discussing the role of objects as mediators of knowledge. Specifically emphasised by these authors was the importance of objects as interpersonal mediators between the people who produced them and the people who contemplate them, an emphasis which marks the first use of semiotics[ii] in the body of work regarding museographic transposition.

Asensio and Pol also pointed to the importance of scientific rigor in research collections, and of the adaptation of domain-specific knowledge - not just applying general findings from psychology, but new theoretical contributions and context-specific studies of the real issues of museums and exhibitions, calling attention to the evolution of didactics – an evolution which has accumulated specific knowledge that may guide the use or non-use of certain types of technologies and other contributions, the avoidance errors, and the use of certain teaching materials and experiments. According to these authors, this specific didactical knowledge may assist in the adaptation and simplification of complex content, minimising the risk of losing the relationship with the reference discipline or falling into the trap of superficial popularization.

Marandino (2001) studied the characteristics of the discourses and areas of knowledge that participated in the construction of the expositive discourse in biology exhibits in order to understand what happened to the scientific knowledge when it was exhibited in museums. The theoretical foundation of the research was an articulation of didactic/museographic transposition concepts and the concept of recontextualization (Bernstein, 1996). Also, the concepts of noosphere (from Chevallard, 1991) and recontextualization campus (from Bernstein, 1996) were used to understand how the actors and the institutions which relate to the areas of science, education, communication and museology participate in the selection and production of the exhibition discourse.

Marandino (2001) studied five museums using observation of the exhibition, interviews with the staff responsible for them, and document analysis in a qualitative approach. The data were aligned with the theoretical framework based on the concepts of museographic transposition and recontextualization and viewed in light of a review of museum research literature. This process characterized the elements of institutions, areas of knowledge and actors that influenced the production of the expositive discourse.

This analysis showed that, in the process of recontextualization, the biological discourse was integrated into the logic of the expositive discourse and participated in the negotiation that occurred in the development of the exhibition, bringing with it its histories, its structure, its contents and its procedures. However, beyond this process, other discourses also entered the negotiation game. A selection process took place in which some elements were left out and new approaches were taken into account with different scopes than that of the original discourse. Depending, among other factors, on the conceptual options - political as well as institution-historical - some voices took part in this discourse negotiation more intensely than others, thus imposing their own logic, structure, procedures and contents.

The results showed that the expositive discourse had a similar behaviour to Bernstein's (1996) pedagogic discourse, by displacing other forms of discourse based on its own principles and

objectives and assuming the characteristics of "recontextualizing" discourse. This means that the expositive discourse had specific characteristics, distinct from the scientific discourse, which resulted from the relationships between time, space and the objects in the museums. Accordingly, the study affirmed that in the process of museographic transposition, the knowledge established specific relations with the elements which behave in a particular way in museum contexts. Also, the knowledge which was selected to be presented in the exhibition passed through a negotiation process (which is epistemological but also political) that involved the professionals, the different areas of knowledge, the history of the museum and of each particular institution and other social actors and institutions from the museum noosphere or recontextualization campus (Figure 1D).

Contemporaneously with the study by Marandino, Gouvêa de Sousa et al. (2002) took up the museographic transposition model from Simonneaux and Jacobi, and as Asensio and Pol, they added a layer of complexity to the model in their discussion of the logics of discourse and space[iii] that governed the transposition process in the production of an exhibition. This work was based in part on the semiotics ideas from Davallon (1999). According to Gouvêa de Sousa et al., the point of departure for the transposition process was knowledge from science text books, and the logic of discourse governed the selective reduction of this knowledge while the subsequent implementation of the knowledge into the exhibition was controlled by the logic of space. The authors thus emphasised the fact that the transposition process changed not only the structure of the knowledge but also its modality; from being mainly textual, it was reified in space, objects and activities in the exhibition. Further, the authors implicitly acknowledged the presence of an intermediate step of transposition, namely an exhibition planning document; however, the implications of the presence of this document for the transposition process were not discussed (Figure 1E).

The exhibition planning document was explicitly introduced into the model by Mortensen (2009) who found the *curatorial brief* to be an important intermediate stage in the knowledge transposition that occurs in exhibition development (Figure 1F). Mortensen found the curatorial brief to extract and transform a scientific object of knowledge into a description of a didactical environment, a role which in some ways is similar to that of a teaching programme in a formal education context. In both cases, the focus of the document in question is to transform knowledge into suggestions for didactical activities (cf. Astolfi et al., 1997); however, unlike in formal education contexts, in the museum context the authors of the document are often identical to the actors that implement the didactical activities – the exhibition. This continuity of the actors involved in the museographic transposition should arguably ensure a corresponding continuity in the knowledge transposition process from scientific knowledge to implemented exhibition, yet Mortensen found a considerable relaxation of epistemological vigilance in the second stage of transposition. The introduction of an intermediate stage of knowledge transposition, namely that of the curatorial brief, may thus help pinpoint the location and cause of the relaxation of epistemological vigilance in the exhibition development process reported in the literature (cf. Gouvêa de Sousa et al., 2002; Belaën, 2005).

Another development of the model of museographic transposition was the inclusion of the idea of a reference model from research in formal education contexts (e.g. Barbé et al., 2005). Earlier uses of the notion of transposition had labelled the knowledge which was the point of departure as the

reference *knowledge* (see Figure 1), but in the new usage, the reference *model* consisted of an epistemological model of a given body of knowledge, a model which is distinct from the scientific knowledge which was the point of origin for the transposition or indeed from the knowledge present at any step of the transposition (Mortensen, 2009). The reference model is constructed empirically

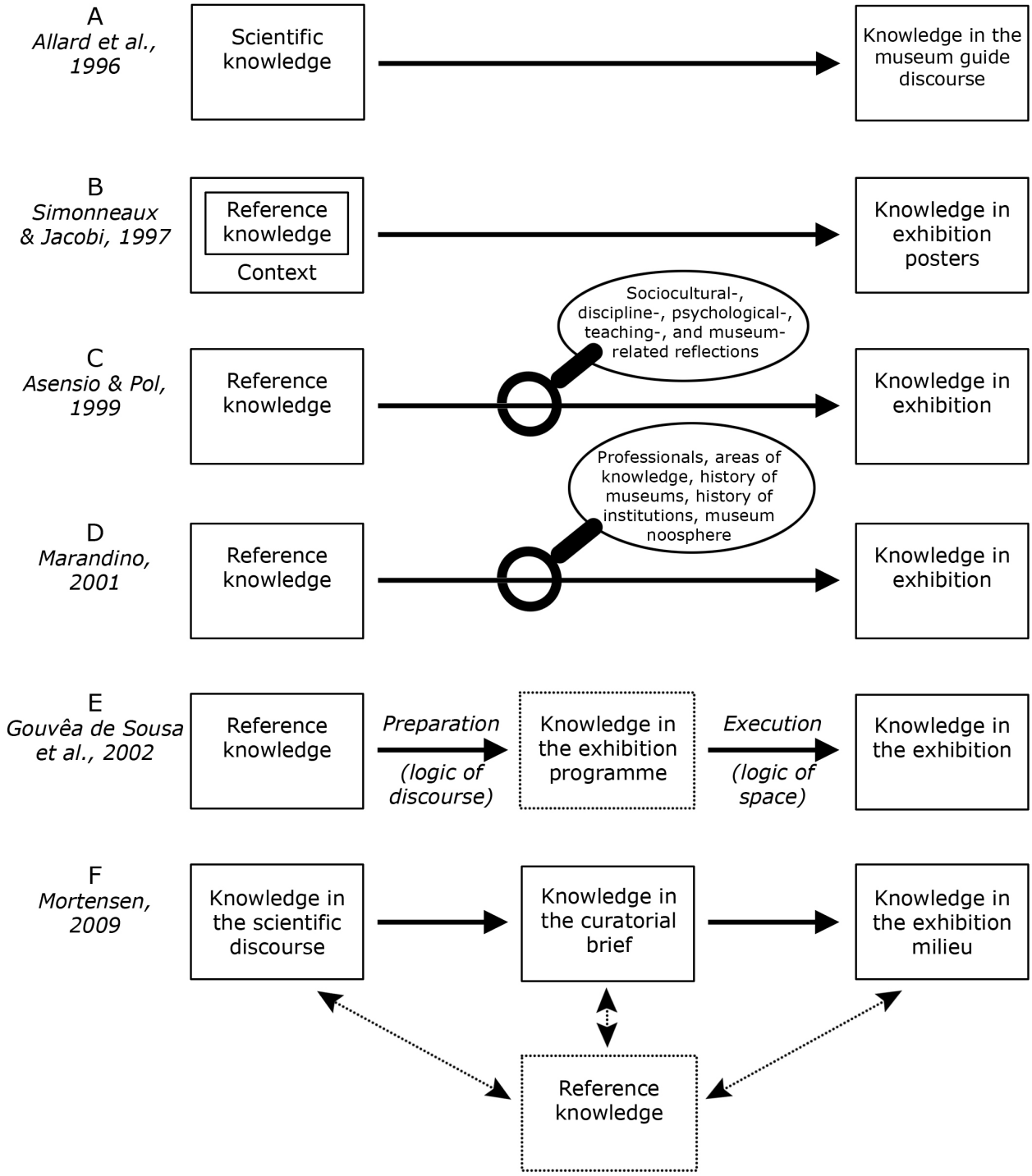

Figure 1. *Our conceptualisations of the models of museographic transposition used in research from 1996 to today.*

to encompass, interpret, and analyse the object of knowledge in each of its transpositional stages and modalities and accordingly serves as a broader didactical map (Barbé et al., 2005), thereby removing the focus from the scientific knowledge as the standard to which subsequent stages of transposed knowledge were compared.

In sum, the model of museographic transposition has been gradually developed and it is possible to identify some approaches on the way this framework is been used on the informal education museum context.

4 Three emergent approaches in museographic transposition research

Three approaches emerge from the body of work described above: an **epistemological** approach that emphasises *knowledge* in the various forms it takes in the transposition process; a **semiotic** approach that emphasises the *forms* that the knowledge takes in the transposition process, related to some of the elements that are present in exhibition context such as objects, time and space; and a **sociological** approach, which focuses on the historical, social, political and cultural influences that participate in the production of the exhibition . All three approaches are to some extent present in all the studies on museographic transposition outlined here; however, we found that one of the approaches was usually the main focus as described in the following.

The *epistemological approach* can be identified in the works of Simonneaux and Jacobi (1997), Mortensen (2009) and Gouvêa de Sousa et al. (2002). In these cases, the concept is the central element of the research and studies focus on what happens to the central concept, what other concepts are related to it in the reference knowledge, and what is the difference when it becomes exhibit knowledge. We designate this approach epistemological as it deals with the difference between the network of concepts in the scientific knowledge and the new relationships that are created – another network – in the exhibit. The approach does not ignore the different modalities of knowledge in the transposition process, but rather, it accounts for them by 'translating' them into a common modality – as illustrated by the application of the reference model in Mortensen (2009).

The *semiotic approach* is mentioned in the work of Asensio and Pol (1999) and can be identified in the research of Gouvêa de Sousa et al. (2002) and Marandino (2001). This research takes into account the elements from the exhibition – such as objects, time and space – to understand the process of museographic transposition. Here, the working hypothesis is that those elements influence directly the way that the exhibit knowledge will be shown, and, consequently, the way that the selection of the concepts and ideas of the scientific knowledge will happen.

Finally, the *sociological approach* is the perspective assumed by Marandino's (2001) work, as she studies the historical, social and political elements that influence the constitution of the expositive discourse. By analysing the history of the museums and the corresponding changes in the educational objectives, and by considering the influence of the social institutions and their actors on

the definition of the role of the museums today, it is possible to identify the increased educational role of those places. Also, considering the history of each institution, their mission and the characteristics of the people who were involved on the production of the exhibitions, it is possible to realize the elements of the museum noosphere. As the perspective of the work of Marandino (2001) tries to understand the way institutions, areas of knowledge and social actors influence the production of the exhibition – what she called a power game – it was necessary to articulate the theory of museographic transposition to the theory of the construction of the pedagogic discourse, from Bernstein (1996). The similitude and distances between the concepts of didactical transposition and noosphere from Chevallard (1991) and recontextualization and recontextualization campus, coined by Bernstein (1996), was analysed. One difference that had been identified on the two concepts is that how they deal with the role of the social and political influence on the knowledge transformation or on the production of pedagogical knowledge. To Chevallard, the academic influence or power is bigger then the social one, witch is coming from the school, teachers, community, parents, or any other social group. On the other hand, to Bernstein, the regulative discourse, based on the social order, is powerful then the academic one and, in fact, it regulate the scientific knowledge (instruction knowledge). So, the concept of noosphere seems to not consider the powerful game – political, ideological, sociological, cultural – as the concept of recontextualization campus does. (Marandino, 2004).

The theoretical reference elaborated by these authors helped to study how five science museums deals with the production of the expositive discourse, selecting some discourses from some knowledge areas and taking the voice form others. In that game, which is also a social and political one - the scientific knowledge sometimes is central determinate the final exhibition discourse, but, in other situations, it's not to powerful and lost space to others discourse – as the educational, communication, museographic ones.

5 Perspectives

The lines of research described may provide fruitful ideas about some of the central didactical questions in informal education contexts such as museums (which are similar to those of formal education contexts such as schools): Where does the knowledge come from? How, and by who was it shaped? What is its degree of effectiveness in promoting learning? The three different approaches present in the research on knowledge transformation in museums each center on one of these questions; thus, the epistemological approach deals mainly with the question of where does the knowledge come from, the semiotic approach considers the effectiveness and mechanisms of the produced milieu in promoting learning, and the sociological approach focuses on how and by whom the knowledge is shaped in its trajectory towards the exhibition. Each of the three approaches has its own merits, and as is always the case in research, the appropriate approach depends on the specific research question. Regardless of the approach chosen, using the museographical transposition framework to answer questions of an epistemological, semiotic, or sociological nature will contribute to a profound understanding the didactics of the informal education field showing, on one hand, the behavior of the *knowledge* in the curatorial process, in the exhibition milieu, and in relation to the public. On the other hand, it could also give valuable information about how the

museographic elements participate in the *process* of didactical transposition that occurs in the exhibition production and about the social actors and institutions which constitute the museum noosphere.

Finally, more recent developments in the Anthropological Theory of Didactics include the notion of praxeology as the basic unit of human activity. In an educational setting, considering the teaching intervention in terms of praxeologies may help to achieve an understanding of the levels of didactic determination in play, and vice versa (Artigue & Winsløw, 2009). A similar approach to the analysis of the museum teaching intervention – the exhibition – could provide valuable insights as to the interplay between the levels of didactical determination in an exhibition setting; however in the present case, the reviewed papers did not offer enough details for the authors to provide such an analysis. Work is under way, though, that employs these notions in an exhibition setting (Mortensen, 2009b).

6 References

Allard, M., Larouche, M. C., Lefebvre, B., Meunier, A., & Vadeboncoeur, G. (1996). La visite au Musée. *Réseau, Décembre 1995/Janvier*, 14-19.

Artigue, M. and Winsløw, C. (2009). *International comparative studies on mathematics education: A viewpoint from the anthropological theory of didactics*. Manuscript in preparation.

Asensio, M. & Pol, E. (1999). *Nuevos escenarios para la interpretación del Patrimonio: el desarrollo de programas públicos.* Universidad Autónoma, Departamento de Psicologia, Madrid.

Astolfi, J.-P., Darot, É., Ginsburger-Vogel, Y., & Toussaint, J. (1997). Transposition didactique. In J.-P. Astolfi, Darot, É. G.-V. Y., & Toussaint, J. (Eds.), *Mots-clés de la didactique des sciences. Repères, définitions, bibliographies* (pp. 177-187). Paris: De Boeck & Larcier.

Barbé, J., Bosch, M., Espinoza, L., & Gascón, J. (2005). Didactic restrictions on the teacher's practice: the case of limits of functions in Spanish high schools. *Educational Studies in Mathematics, 59*, 235-268.

Beetlestone, J.G., Johnson, C. H., Quin, M. & White, H. (1998) The Science Center Movement: contexts, practice, next challenges. *Public Understanding of Science*, *7*, 5-26.

Belaën, F. (2005). L'immersion dans les musées de science: médiation ou séduction? *Culture & Musées, 5*, 91-110.

Bernstein, B. (1996). *Pedagogy, Symbolic Control and Identity.* London: Taylor and Francis.

Bradburne, J. M. (1998) Dinosaurs and white elephants: the science center in the twenty first century. *Public Understanding of Science, 7,* 237-253.

Chevallard, Y. (1991). *La Transposición Didáctica: del saber sabio al saber enseñado*. Editora Aique, Argentina.

Chevallard, Y. (2007). Readjusting didactics to a changing epistemology. *European Educational Research Journal, 6*(2), 131-134.

Davallon, J. (1988). Exposition scientifique, espace et ostension. In: La divulgation du savoir: theories et pratiques semiotiques. *Expo Media, 16*(3), 5-16.

Davallon, J. (1999). *L'exposition à l'œuvre*: stratégies de communication et médiation symbolique. Paris: L'Harmattan.

Dean, D. (1994). *Museum Exhibition – Theory and Practice*. London: Routledge.

Experimentarium. *Experimentariums mål og politikker*. [Experimentarium: objectives and policies]. Retrieved 28-2-2008, from: http://www.experimentarium.dk/presse_corporate/tal_fakta/maal_og_politikker/

Exploratorium. *Exploratorium: more than a museum - a learning laboratory*. (Available from http://www.exploratorium.edu/about/InstitutionalBrochure_06.pdf). 11 p.

Gouvêa de Sousa, G., Valente, M. E., Cazelli, S., Alves, F., Marandino, M., & Falcão, D. (2002). A study of the process of museographic transposition in two exhibitions at the MAST (Museu de Astronomia e Ciências Afins). In C. Dufresne-Tasse (Ed.), *Evaluation: multipurpose applied research* (pp. 108-124). Québec: Éditions MultiMondes.

Layton, D., Jenkins, E. W., Macgill, S., & Davey, A. (1993). *Inarticulate science?* Driffield, UK: Studies in Education.

Lucas, A.M. (1991) "Info-Tainment" and Informal Sources for Learning Science. *International Journal of Science Education*, *13*(5), 495-504.

Marandino, M. (2001). *O conhecimento biológico nos museus de ciências: análise do processo de construção do discurso expositivo*. Doctoral thesis, Universidade de São Paulo, São Paulo.

Marandino, M. (2004). Transposição ou recontextualização? Sobre a produção de saberes na educação em museus de ciências. *Revista Brasileira de Educação, 26*, 95-108.

Mortensen, M. F. (2009a). Museographic transposition: The development of a museum exhibit on animal adaptations to darkness. Manuscript submitted for publication.

Mortensen, M. F. (2009b). *Visitors' experience and understanding of an immersion exhibit on animal adaptations to darkness*. Manuscript submitted for publication.

Ramos, F.R.L. (2004). A danação do objeto – o museu no ensino de História. Editora Argos/CEOM, Chapecó

Schärer, M. R. (1999). La Relation Homme-Objet Exposée: Théorie et Pratique D'une Expérience Muséologique. *Publics & Musées*, 15, 31-43.

Simonneaux, L. & Jacobi, D. (1997). Language constraints in producing prefiguration posters for a scientific exhibition. *Public Understanding of Science, 6*, 383-408.

Van-Praët, M. & Poucet, B. (1992). Les Musées, Lieux de Contre-Éducation et de Partenariat Avec L'École, In: *Education & Pédagogies – dés élèves au musée*, No. 16, Centre International D'Études Pédagogiques.

Webster's encyclopedic unabridged dictionary of the English language (1989). New York: Gramercy Books.

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[i] The term ‘scientific knowledge’ is used to denote that which Chevallard (1991) designates as ‘savoir savant’.

[ii] Semiotics is a general theory of signs and symbolism, and is usually subdivided into the branches of pragmatics (the relation of signs to their impact on those who use them), semantics (the relation between signs and the things they refer to), and syntactics (the relation of signs to each other in formal structures) (Webster's encyclopedic unabridged dictionary of the English language, 1989).

[iii] The authors include ‘gesture’ as the logic which governs the mediation of knowledge from exhibition to visitor; we do not include this step in our review of the transposition model here.