Learning Facilities and Learning Spaces in Museums
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Report 8 – Learning Facilities and Learning Spaces in Museums
The Learning Museum Network Project
Edited by Ann Nicholls and Margherita Sani

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Front cover (titles and credits of front cover pictures)
Photo 1: Learning Facility „Guess which musical instrument from the exhibition is played“, Schlossmu-
seum (Castle Museum) Linz 2013 @ State Museum of Upper Austria.
Photo 2: Learning Facility „Palm or Arnica?“, Schlossmuseum (Castle Museum) Linz 2013 @ State Mu-
seum of Upper Austria.
“Learning Facilities and Learning Spaces in Museums” is one of the reports which are published within the framework of the EU funded project LEM – The Learning Museum, which aims to create a permanent network of museums and cultural heritage organisations, to ensure that they can exploit their potential as learning places and play an active role with regard to lifelong learning in a knowledge-based Europe.

The project is funded by the Lifelong Learning Programme Grundtvig for the period 2010-2013 and can be regarded as the arrival point of a number of previous EU projects carried out between 2007-2010, which dealt with lifelong learning in museums (LLML and MUAMA), intercultural dialogue (MAP for ID) and volunteering (VoCH), all of which are documented on the LEM website.

LEM not only draws from the materials collected, the lessons learned and the contacts established by its forerunners, but moves one step further in the direction of establishing a permanent space for museum professionals and adult educators to meet, exchange experiences and good practices, and to learn from each other, therefore contributing to the creation of a European community of professionals interested in heritage education and lifelong learning in museums.

The network started with 23 partners from 17 European countries, plus one partner from the United States of America – the Museum of Anthropology of the University of Denver - taking advantage of the possibility opened in 2010 for the first time by the Lifelong Learning Programme, to involve third country organisations.

As a network, LEM aims in the first place to grow and acquire new associate members which, in September 2013, had already tripled the founding institutions. A wide range of museums, heritage organisations, academies, institutes for learning and universities are now part of the network, representing 25 countries. There are Ministries, Museum Associations and other umbrella organisations, individual museums, small and large, institutions active in the education field, all working on an equal level and engaged in sharing information, making it available to a wider public and learning from one another.

The philosophy of LEM indeed is that of considering museums not only as learning places, where educational activities are delivered, but as learning organisations themselves, learning from the public, the local community, other agencies and, of course, from other museums.

The idea of peer learning is core in LEM and, in order to support it fully, work has been divided into working groups, each led by a LEM partner.

The research subjects have been chosen by the working groups themselves:
website and eventually producing a report on the theme researched, working groups undertake study visits to each other or to third institutions, to come in contact with working practices of other colleagues throughout Europe.

This idea of learning by being directly exposed to other people’s practices and experiencing different work environments represents an important added value to the project, not only with regard to the members of the working groups, but more widely, through the LEM mobility scheme which is open to partners and associate partners and provides the possibility of spending some time working in another institution.

In fact, some of the project partners, initially five, but increasingly more, have offered placements to other LEM members for periods lasting from a few days to two weeks to three months. This results not only in the strengthening of ties within the network at a personal, professional and institutional level, but allows individuals to actually learn by being exposed to different working situations.

Dissemination is another important aspect of LEM. International conferences, seminars and round tables are being organised regularly and attract a wide European audience. They are occasions for intensive networking and learning, offer plenty of social events and are combined with visits to local institutions to meet stakeholders. Where possible, they are also live streamed to reach an even wider public worldwide. A number of smaller dissemination events are organised, also at local or national level.

Finally, the website is the digital platform where all the knowledge acquired by the project is kept and made available. It is a dynamic and interactive forum, first of all to receive and exchange materials about the subject area ‘museums and lifelong learning’, and secondly to provide information about the project. It is a virtual learning environment providing information on existing literature, projects and actors and is kept updated through continuous research, data analysis and provision of new information by an international editorial team and by the project partners. Everyone is invited to send materials to be published on the LEM website, and participation is favoured through the use of web 2.0 tools. At the beginning of each month an electronic newsletter is sent out to all those who have subscribed to it.

The website therefore functions as a community-building tool for all those who are interested in the topics addressed by LEM. Through the networking activities of its partners and associates, the website and the dissemination events, LEM expects to reach the whole museum and heritage community and a large part of the adult education sector.

www.lemproject.eu
Introduction: Working Group 4
Interactive Learning Facilities and Spaces as an instrument for a more open and accessible museum

When you are eager to change your own museum and create new inspiring learning environments for different groups, would it not be helpful to share experiences and learn from museums who already took this step, preferably in a European context? This was the starting point for our work in the LEM-project working group 4.

Our own museum, the State Museum of Upper Austria in Linz, is a multidisciplinary museum with a history going back to as early as 1833. In recent years, like many other European museums, our strong focus has been to become a more open and friendly, inspiring learning institution which caters for all different visitor groups in a diverse society. We have a long tradition in creating special education programmes and guided activities for a broad range of groups from kindergarten pupils and students to families, migrants and seniors. But we, the education department of our museum, also had in mind students to families, migrants and seniors. But we, the education department of our museum, also had in mind the Austrian Museums Association on the topic of ‘The Learning Museum - Learning in Museums. The museum as a place of education and learning', which saw over 40 participants discussing ways to help diverse types of visitors to enhance their learning experience in the museum. Soon the decision was made to dedicate our work in the project to ‘Learning Facilities and Learning Spaces in Museums’, defined as interactive (both analogue and digital) installations for individual museum visitors, either integrated into the exhibitions (learning facilities) or as separate areas (learning spaces). We collected information and searched for interesting examples where museums had created new learning environments. A LEM study visit to museums in Glasgow provided us with a great source of inspiration. A LEM study visit of partners from the UK, Italy, Germany and Austria to our own museum gave us a lot of valuable input and a chance to have prolific discussions on the topic of creating inspiring learning environments. In June 2012 we hosted a conference in Linz in cooperation with the Museumsakademie Universal museum Joanneum and the Austrian Museums Association on the topic of ‘The Learning Museum - Learning in Museums. The museum as a place of education and learning’, which saw over 40 participants discussing ways to help diverse types of visitors to enhance their learning experience in the museum.

First of all there had to be a discussion on the meaning of ‘learning’ in a non-formal context such as in a museum. A very influential theory of learning in museums in recent years has been Constructivism, expressed among others by George Hein: “Hein explained that constructivist exhibitions enhanced learning through enabling visitors to both validate and also re-think their own interpretations of a subject by allowing them to consider other interpretations, perspectives and ideas about a topic. Museum learning exhibits provided under a constructivist framework would encourage learners to use both their hands and their minds to experiment with the world and reach their own conclusions.”

So how can environments that ‘encourage learners to use both their hands and their minds to experiment with the world’ be created, given the fact that different visitors represent very different approaches in their individual learning, and have different preferences and motivations? Various learning styles have to be taken into account. Among the most popular theories of learning styles is the one developed by David Kolb. Kolb distinguishes between Dreamers, Deliberators, Deciders and Doers. Put into the context of developing inspiring learning facilities and learning spaces for the different learning groups, Dreamers should find encouragement to use their imagination, with ‘unidentified objects’. Deliberators should be intellectually challenged, for instance by assembling objects in the correct order. Deciders should be able to find the right answer to a question or problem, for example by means of a quiz. Doers should be actively involved, for instance by doing a practical experiment. The consideration of different learning styles in creating learning facilities and spaces also allows individuals - who in reality often represent a mix of different learning styles - a multi-method approach to learning in the museum. Moreover, a very important aspect to be taken into account is the interaction between visitors. Most visitors do not come alone, but accompanied by their family, their grandparents or their friends and share their museum experience with them. Learning theory in recent years has emphasised the important role of social, collaborative learning. Learning facilities/spaces should therefore be designed in a way that supports collaboration.

Multi-method learning approaches which allow for many different learning styles could include: bringing all the senses into play: handling, smelling, touching, dressing; active experimentation: experiments, construction, assembling; entertainment: games, fun, humour; mental challenges: tasks/brain teasers, puzzles, creating sequences... and much more. An observation, encouraging especially for smaller museums, is that successful learning facilities/spaces are not dependent on the budget but on the creative minds of their developers.

While our own museum was involved in the process of creating learning facilities (several interactive facilities in the permanent exhibitions were opened in 2012), the LEM project gave us the opportunity to exchange thoughts about this topic with our partners. A lot of practical questions arose. How many resources are needed to maintain the interactive facilities once they are finished? How do you evaluate their success? When should you decide to do adjustments?
We decided to create a survey for museum staff members to collect and share experience among European museums. The basic thought was: which questions are of common interest? At the same time the survey should not be too long in order to be answered. A distinction between learning facilities (integrated into exhibitions) and learning spaces (separate areas) seemed to us to be necessary. We wanted to receive answers from a broad range of different kinds of museums. We decided to create an online survey, but also developed a print version for distribution. The survey was spread to all our LEM partners as well as to other museums via the Austrian Museums Association, the Swiss Museums Association and the German Museums Association. The survey was online from March 13 – Sept 20, 2012. When we closed the survey, we were able to analyse full answers from 78 museums in 10 European countries.

Working Group 4: ‘Learning Facilities and Learning Spaces in Museums’

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The Online Gallery www.learningmuseum.net

Based on the results which delivered an astonishing number of in-depth descriptions of learning facilities and spaces, we decided that there had to be a next step: a virtual picture gallery presenting such impressive examples, with two aims: on the one hand giving an inspiration to museum staff members, on the other hand showing to the public the variety of innovative learning opportunities in today’s European museums.

We discussed several questions with our LEM partners: How should an inviting and user-friendly online photo gallery look? What information should there be on the main page, how should the navigation be organised? And, even more important, how much text information should be attached to the photos? Should there be a narrowly defined framework for each contributor to the website? And if yes, what categories should the framework include?

In early 2013 we built a draft website under the newly rented domain www.learningmuseum.net and gained prolific feedback from our LEM partners. We defined the following questions which were about to be included in a form sent to potential contributors:

- Museum: name, address, phone number, website, e-mail address (of responsible unit)
- Name/ Title of interactive facility/space (if there was no actual existing name, contributors were asked to choose a fitting name for identification purposes)
- Type of interactive facility/space (example: multimedia installation illustrating the role of canals in the economic development of Bologna)
- Type of design (example: freestanding furniture; glass jars filled with herbs; pharmacy’s old recipes that can be looked up; information on herbs and their properties)
- Activities (example: Smelling, touching, matching, experiments, ...)
- Target audience (example: all age groups)
- Conception (example: curator, art educator(s), exhibition architect)
- Implementation (example: subsequently added to a permanent exhibition)
- Experience (example: entertaining for all age groups but maintenance-intensive (replacing and refilling of glass jars with herbs))
- Specific features (example: all interactive facilities highlighted by the colour yellow)

The contribution form also included the note that one should take care of usability of the website and try to be focused, thus keeping the answers brief. However, further information could be provided on the homepage of the respective institution and contributors were invited to add links to their own homepage.

As visible on the screenshot of the main page, we decided that the appearance of the homepage should reflect the intention of the project as a gallery and therefore be more visual than dominated by text.

The gallery should be user-friendly and self-explanatory in its use right from the main page. The main page should – despite being not too long in texts – describe in a few words the intention of the project and also contain information on how to search the gallery, how to learn more about learning facilities and spaces in museums, and how to participate by contributing learning facilities and spaces of a user’s own institution.

Finally, there should be a reference to the LEM project as the driving motor behind the creation of the gallery. And there should be a navigation menu to search. All this is shown in the enlarged head of the main page.

Searching the gallery works in three ways: either by clicking a picture of a learning facility/space on the main page, by going to a list of participating museums (leading to a submenu listing all learning facilities/spaces of that respective museum) or by filtering the elements by topic.

How do then the individual learning facilities and spaces appear on the homepage? The following three screenshots show examples from the Schlossmuseum (Castle Museum) Linz, the Museo della Storia di Bologna (Museum of The History of Bologna) and, as an example of a separate learning space, The Clore Discovery Centre at the National Museum Cardiff. Each entry can have from 1 up to 6 photos on the left side and on the right side contact details of the respective museum on the top and below the
descriptions in the defined categories (title, type, design, activities, target audience, conception, implementation, experience, specific features).

With a growing gallery, we hope to come closer to fulfilling the two main aims of the website as already defined: on the one hand giving an inspiration to museum staff members, on the other hand showing to the public the variety of innovative learning opportunities in today’s European museums.

Wheel of Fortune

- **type of learning facility**: Turning the wheel allows visitors to experience a time journey: Fate decides on their role in the time around 1600, from king to nobleman, from scientist to priest, from merchant to peasant, from peasant to beggar. Fitting clothes and descriptions are provided for each role.
- **type of design**: Wheel which can be operated by visitors with 15 possible characters on it; 15 baskets with clothes and accessory for each role; text panels for each protagonist.
- **activities**: Transform into a character in another time, dressing, acting, learning about social classes in history.
- **target audience**: 9-12 year olds.
- **conception**: Education department.
- **implementation**: Within a temporary exhibition about the time around 1660.
- **experience**: Not only used by children, but highly frequented by adults.

**The City of Water**

- **type of learning facility**: multimedia installation illustrating the role of canals in the economic development of Bologna
- **type of design**: The installation consists into projections on the floor and on the walls. Visitors can interact with the floor, which reproduces a canal flowing along an apparently endless curved underground tunnel. Through motion sensors with a visual effect as they are walking on waters, moving in the space they activate video clips projected on a wall (covered by mirror) presenting different aspects of the role of canals in the economic and social life of Bologna in the past.
- **activities**: Interactive learning process activated moving in the space.
- **target audience**: All age groups.
- **conception**: Curator, exhibition architect, multimedia authors.
- **implementation**: Conceived within the permanent exhibition when building the museum.
- **experience**: Typical example of entertainment: there is fun and learning at the same time. The installation is technologically sophisticated but it does not require a relevant work of maintenance. Open one year ago, it has not shown serious problems so far.
- **specific features**: The exhibition environment is designed like an underground canal outlined by Wood’s lamps threads which give a fluorescent blue light effect to the whole space.
defined as activity-based elements integrated into the exhibitions, such as hands-on, experiments, interactive exhibits - analogue or digital - games, discovery stations, etc. in their permanent exhibitions (many of them only established in recent years), and 31 in their temporary exhibitions. 20 museums indicated that they have created designated ‘learning spaces’, which were defined as separate activity-based areas for individual visitors, such as discovery centres, children’s museums etc.

• A high number of respondents delivered astonishing in-depth descriptions of their learning facilities and spaces, as well as descriptions about the process of developing them, including questions like learning theories and visitor research. We believe that the results of the survey can be of interest both to museums with already established active learning facilities and spaces as well as to museums which are considering similar developments in the future.

• The full results of the survey are published in this appendix; all questions and submitted answers are shown without any alteration except translation: the German answers of the bilingual English-German survey have been translated into English for the purpose of this publication.

Results of the European Museum Survey ‘Learning Facilities and Learning Spaces in Museums’

This bilingual (English-German) online museum survey was created within the LEM-project (The Learning Museum) of the European Union by LEM-Partner Upper Austrian State Museums (Oberösterreichische Landesmuseen). Participation in the online survey was promoted via the LEM-network as well as via the Austrian Museums Association, the Swiss Museums Association and the German Museums Association. The survey was online from 13 March – 20 September 2012 and concluded with 78 museums responding. These represented a wide variety of museums from all over Europe (answers from AT, DE, CH, UK, BE, DK, SE, FI, IE, RO), including art museums, cultural history museums, natural history museums and many others.

• The survey aimed at investigating the development, character and maintenance of innovative active learning facilities in European museums for individual visitors (not guided groups) which motivate them to take an active part in the museum. The trend, which can be easily recognised at a first glance, is that many European museums have undertaken steps in recent years to reshape their permanent and temporary exhibitions and offer their individual visitors new opportunities to support their individual learning.

• 38 museums indicated that they have created ‘learning facilities’ for individual visitors, which were defined as activity-based elements integrated into the exhibitions, such as hands-on, experiments, interactive exhibits - analogue or digital - games, discovery stations, etc. in their permanent exhibitions (many of them only established in recent years), and 31 in their temporary exhibitions. 20 museums indicated that they have created designated ‘learning spaces’, which were defined as separate activity-based areas for individual visitors, such as discovery centres, children’s museums etc.

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The Cloré Discovery Centre at the National Museum Cardiff

• type of learning site: A hands-on gallery housing hundreds of specimens from the four areas of the museum’s collections (archaeology, geology, natural history and art). Our daily ‘Manual’ Discovery Showers contain a book with interactive text and activities to inform visitors about the objects and to encourage discovery through exploration. In addition there are larger specimens (e.g. animal skulls) on the walls and on open display which visitors are encouraged to touch. The space provides physical and intellectual access to the range of collections held by the Museum through the use of a variety of ‘tapping tools’ and the opportunity to engage with specialist learning and curatorial staff.

• type of design: The 180 squared feet gallery is furnished with approximately 60 pull out drawers housing the ‘discovery drawers’. Digital microscopes and magnifying glasses and measuring equipment allow more detailed exploration. Within the gallery there is an area specifically for children under the and their grown ups. Here there are ‘Little Explorer’ boxes with toys, games and picture cards linked to the display and collections in the dedicated consultation area for responding to enquiries from the public about specimens/objects. The facility is display specific with a storing area for stools which alternate with an activity area and features retractable, raised seating for lecture talks.

• activity/less:

  • Tactile, measuring, exploring, entrapment, comparing, matching, interactive learning, drawing, reading, questioning. The gallery delivers a varied programme of formal and informal learning sessions. The gallery’s collection is at the core of all of these sessions. Also learning staff working in the gallery have developed a bank of resources to support visitors’ enquiries about the collections.
1. What is the main focus of your museum? (Multiple answers possible)

- Art
- Cultural history
- Natural history
- Technology / Science / Industry
- Multidisciplinary museum / Universal museum
- Folk art / Regional & local history
- History / Archaeology
- Literature / Theatre etc.
- Architectural monument (Castle / Stately homes etc.)

2. Which tools for museum interpretation do you use to enhance the learning experience of your individual visitors (apart from guided tours, workshops etc.)?

- Mobile technologies (tablets, smartphones...)
- Audioguide
- Audio stations
- Film/video
- PC terminals
- Object labels
- Name-specific sheets
- Text panels/rooms
- Text panels/topic

Open mentions: interactive demonstrations, Apps, communicating content on-site, i.e. in the exhibition as well as outside the museum (offers for experts, special groups and media representatives), live drama, interactive facilities, writing workshops, guided tours, interactive facilities, self-guided work sheets, VR techniques, models, sheets for schools, workbook for children, catalogue for children, puzzle rally race, learning assistants/guides, events/talks/workshops, cookery sessions, outreach programmes, interactive experiments, interactive projections, discovery towers for younger visitors, sections on material, learning assistance (a member of staff visitors can talk to about the exhibit), craftsmen, interactive discovery table, interactive photo binoculars.

3. Does your museum provide special innovative learning facilities (activity-based elements integrated into the exhibitions, such as hands-on, experiments, interactive exhibits -analogue or digital, games, discovery stations) and/or designated learning spaces (separate activity-based areas, such as discovery centres, children museums) for individual visitors to motivate them to take an active part in the museum? (Multiple answers possible for options 1-3)

- Yes, special innovative learning facilities integrated into permanent exhibitions
- Yes, special innovative learning facilities integrated into temporary exhibitions
- Yes, designated learning spaces (separate activity-based areas, not inside exhibitions)
- No, this is not suited for our museum./ It does not fit with our objects/presentation
- No, but we are considering it. / It’s an idea worth exploring
- No, not considered at the moment

Open mentions: Maritime history; Architecture; Religions, beliefs, cultures and religious art; Everyday culture (2x); Associations of museums of all sectors; Wildlife conservation.
**Questions to museums with ‘learning facilities’**

4. Can you give a brief description of your special innovative learning facilities integrated into the exhibitions?

   Please also include a list of what interactive elements (regardless of whether analogue or digital) you offer your visitors, in order to support active learning, and how they are integrated into the exhibitions.

   1. Sorry, no list, we have around 2,300 interactive elements of all types...
   2. In an exhibition about an architect, Carl Bergsten, we have two kinds of puzzle for children and adults. a) They can build a school with pieces of tree. b) They can make a colour-pattern on the light table. We have facilities for children to handle archaeological artefacts in order to understand the work of an archaeologist. They describe and copy the artefacts with pen and paper.
   3. Tailored to the needs of the temporary exhibitions; analogue as well as digital elements.
   4. Learning facilities are rarely integrated into the exhibitions. If so, they are of a very playful character, e.g. in the exhibition Wirtschaus (pub/inn) visitors were asked to guess what a typical Austrian Wirtschaus looks like. In the Römermuseum’s (Roman Museum) permanent exhibition, we provide facilities typically designed for children, e.g. figures to mix and match, three-dimensional puzzles, etc.
   5. A cube with short texts (German/English) and stamps, adapted to the content of the exhibition (bells for the chimes, guest book at the end of the tour), integrated into the exhibition: boxes with building material that can be touched (topic: construction of cathedral), magnet board with dishes and cutlery made of cardboard (topic: table manners in the baroque period), doing coin rubbings into the accompanying booklet (topic: archbishops in Salzburg), coat of arms as a puzzle with movable parts, etc. Aubérin’s shrine household shrines to be opened with a key which children can get in the museum shop, audio guide for children, related to various themes of the shrines; content changes depending on the section of the exhibition (puzzles, games, musical instruments, altars, floral symbolism in the Middle Ages).
   6. In the permanent exhibition: The media stations (for listening and for films) enable visitors to deepen their knowledge and study specific content further. For additional information on products from medieval markets, visitors can use the ‘Middle Ages computer’. With the help of an abacus, visitors learn how people in the Middle Ages did calculations. Also, there is a stepper which enables visitors to physically experience the crossing of a mule-road. At the end of the exhibition, children can put on armour and damsels’ clothes, and have their picture taken. In the temporary exhibition: in the planned exhibition on toys and games (October 2012 — March 2013), visitors will be able to play modern-day board games and electronic games under the guidance of an expert.
   7. We have two animations on a touch screen which show shipping loads and routes 1860-present. This isn’t hugely interactive but visitors can choose which ship they would like to watch. We have a sailing ship’s mast, built by a boat builder, which visitors can climb (at their own risk). We plan to

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**Additional question to respondents with answer “No, but we are considering it”:**

3a. You have indicated that you are interested in planning special learning facilities or designated learning spaces. What groups of visitors do you especially have in mind as users? (1=low priority, 6=high priority)
Within our permanent exhibitions we have a tashioned house display, a variety of audio points throughout the museum that give oral histories on a variety of subjects (First World War, dialect etc.), props to encourage further learning about the museum, e.g. smelly cheese that would have been sold in our old shop, aprons to put on when doing the clothes washing at 'The Steamie'.

We have a loading puzzle, in the 'modern shipping' area where visitors add blocks into a model of a ship to see if they can balance the loads properly. We have a karaoke, which perhaps does not support active learning but does help engage visitors.

They are a space situated in or beside the galleries and contain things such as books to give context to the exhibitions/artists' practice, examples of the materials used to touch and smell, videos of talks which the artist has given.

Within our permanent exhibitions we have a number of basic interactives with which families can engage. These involve matching activities (matching Glaswegian dialect to English words), making choices (1. choosing which objects you would take with you if you were evacuated; 2. making choices about the death penalty) and various have-a-go activities that allow visitors to try out experiences with the artist has given.

We wanted our tour to be exciting and varied, so we make the space in response to the work and what issue we want to discuss in direct relation to it. In these spaces we have used books, video, QR codes, artistic materials, sound.

11. a) Combination of facilities with different levels that allow visitors to delve more deeply into the subject matter, e.g. rotary tables, drawers, inspection flaps.

b) Integration of the objects into complex educational contexts, e.g. reconstruction of picture with integrated objects.

c) Discovery stations of different kinds.

d) Large models explaining dynamic processes.

e) Living surface.

f) Media stations: living maps, dialogues related to history. The exhibition is divided into six subject areas. We wanted our tour to be exciting and varied, so we adopted the following criteria, relating them to each other: content, target audience, dramaticity.

12. The Altonaer Museum holds an interactive section called 'Children's Olympus' (Kinderolymp). It consists of movable parts/rotating discs: children are supposed to match pictures with plant species. There are three pictures for each plant (the natural habitat of the plant, its manufactured form, the sectional view of the plant we know from using it as an ingredient). Children can either play on their own or with their parents. Children are quicker in realising that these pictures are colour-coded — an opportunity for self-checking.

In a glass storeroom, visitors can marvel at the diversity of crop plants. Only at second glance, it becomes apparent that the intended use of the plants provides the basis for their grouping/classification.

There are two so-called 'exploration drawers' with specimens allocated to each of the 13 groups. These specimens, as well as various things visitors may bring along, can be observed under a stereomicroscope. Visitors can look at certain objects more closely, selected activities that allow visitors to delve more deeply into the subject matter) visitors can use them according to the amount of time they have on their hands, their prior knowledge as well as their interests. However, the use of these Vertiefungsebenen is not essential to understanding the exhibition's message. They are part of a complementary nature. These facilities are not interactive in the narrower sense of the word. There is always cross-linking and there are connections to the rest of the exhibition. The permanent exhibition is dedicated to 'agricultural crops'.

We started to provide cross-generational facilities. By using a touch screen, parents and grandparents can, for example, look up short descriptions of agricultural crops (using either the botanical name or the German one). Right next to this facility, children can interact with our 'Triolino'. It consists of movable parts/rotating discs: children are supposed to match pictures with plant species. There are three pictures for each plant (the natural habitat of the plant, its manufactured form, the sectional view of the plant we know from using it as an ingredient). Children can either play on their own or with their parents. Children are quicker in realising that these pictures are colour-coded — an opportunity for self-checking.
from the large variety of the glass storeroom. For this purpose, we provide themed tables equipped with drawers – focusing, for example, on crop diversity and different options for processing crops. These tables consist of a mix of different facilities: appealing to different senses, cross-generational and with different Vertiefungsebenen.

We deliberately make very sparing use of digital facilities. For one thing, they can only be showcased when actually adding another dimension, and second, we need to ensure that cost/expense of maintenance and budget/personnel capacities are in due proportion.

20. Pets, fossils and stones can be touched, texts for children, listening stations, earthquake simulator, interactive flow models, microscopes, stations for experimenting – on the hardness and density of minerals, films, interactive screens providing additional information (texts, pictures, films, games), switches to turn on lights (e.g. light distribution, matching of objects, cold light and insects), a rotary disc illustrating the development cycle of cockchafers, drawers, flaps, loopholes, ‘touch ‘n’ feel box’, ‘smell ‘n’ feel stations’. These are integrated into the exhibitions to different extents.

21. Interactive facilities: In the archaeology section, there are a number of stations aimed at exploring, discovering and testing – grinding corn, stone drills, etc. –
• A working space equipped with a lab – identifying tools, woodworking, bone identification, information cards about the production and use of tools.
• Videos: (animated) reconstructions in the field of dinosaur research, archaeotechnique in the field of archaeology, info terminals – Altar through the ages.

22. Laboratory benches related to the theme of rocks and minerals, for participation. Flow model called Rhine (Rhein) inviting people to participate.
• earthquake simulator;
• in the permanent and temporary exhibition, various microscopes for observing stuffed animals;
• in the permanent exhibition, videos about the motion of tectonic plates, meteor crashes and insects;
• in the temporary exhibition, additional ‘listen ‘n’ smell stations’.

5. What group of visitors did you especially have in mind while planning special learning facilities integrated into your exhibitions? (1=low priority, 6=high priority)

Families with children between 6 and 12
Families with children under 6 years of age
People with special needs
Adolescents
Adults
Senior citizens
Migrants

6. Who brought up the idea of creating special learning facilities in the first place?

Political mandate: 1
Head of the museum: 8
Education Department: 10
Curator(s): 2
Other: 4

Open mentions: Educators and curators
Not sure (I was not working here then), Marketing, project management and museum management

No answer: 13
7. Who is involved and to what extent are they involved in the actual planning of your special learning facilities? (1=not involved, 4=very involved)

- Education Department
- Museum Management
- Curators
- Exhibition Designers / Architects
- Technical / IT staff
- Consultants

Open mentions: volunteers, marketing, partner schools/partner university, name giver Loki Schmidt

8. Did you face challenges / obstacles during the process of creating special learning facilities in your museum, especially where they involved an existing exhibition? If so, please specify in a few words.

Open mentions for “Yes”:
1. We have to work with the artist as for some artists the space is an installation and you have to make sure the learning space does not detract from the work. Some artists do not wish their work ‘explained’ or for anything in the space to take away from the visual impact, so we have to explain to the artist why this is important and work with them so they are comfortable with the learning facility in the space.
2. Financial challenges.
3. Landscape changes in the nature reserve and the premises of the museum were not welcome/allowed at the beginning, hence it was necessary to adopt a considerate approach and develop an unobtrusive design.
4. Equipping the camera obscura with today’s technology so that pictures can be sent to the computer and then be edited.
5. Preservation of historical object substance.
6. It was particularly difficult in cases where architects or financial backers wanted to prioritise the design over the content and its presentation.
7. Search for sponsors, durability of the facilities, intuitive comprehensibility.
8. As interactive facilities are high-maintenance, they are often the first to be sacrificed. Curators usually think of their target audience as well-educated adults.

9. How much time do/did you allow for the planning and realisation of your special learning facilities?

- Less than six months
- Six to twelve months
- From the beginning of the planning of a new exhibition onwards.
10. Could you give an approximate percentage for the share of the budget of an exhibition that was used for special learning facilities?

Open mentions: 40%, 20%, 5%, 3%, 10%, not sure, 10%, was not in post at that time, 5%, 50%, 5%, 15%, 5%, 15%, 10%, 3%, 10%.

11. Did you take into account the results of visitor polls in planning your special learning facilities? If so, in what way?

Open mentions under “Yes”:
1. We take into account all the feedback which is given and it helps us develop our ideas for what will go into learning spaces.
2. Yes, we consult with various access groups and undertake visitor studies.
3. We take feedback via visitors' books and comments cards. We have taken into account people wanting a broader range of resources and the opportunity to learn, not just from reading.
4. Analysis of target audience: current visitors and potential visitors; enquiring about wishes, expectations and needs
5. Visitors ask for more opportunities to touch things and to take an active part.
6. We asked both about the wish for interactive facilities and the actual use. About 47% of our visitors expect interactive elements, whereas less than 30% actually make use of them.
8. Questionnaires and face-to-face conversations.
9. Visitor observation (of visitors engaging with the facilities we first introduced) led to useful extensions.

12. In planning your special learning facilities, did you take into consideration any specific learning theories or learning types? If so, please specify in a few words.

Open mentions under “Yes”:
1. Enquiry-based, experiential learning; practical, activity-based learning.
2. Hands on.
3. I don’t think so (again, most of the planning was done before I came).
4. All education staff have training in current trends in museum education and learning styles.
7. Provide a sensory-rich experience.
8. The design of the facilities was guided by insights of the psychology of perception, i.e. there are different facilities for auditory, visual or haptic learning types.
9. Findings from various disciplines.
10. Constructivist theory of learning – learner constructs ideas and concepts himself/ herself – creating a positive learning environment, situational and
problem-solving, independent learning. Visual, cognitive, kinaesthetic, auditory types of learners are taken into account – in the order given (among other things determined by our financial means).

11. Discovery learning and independent learning are paramount.

13. With regard to your special learning facilities, how important are the following aspects? (1=not important, 6=very important)

- Inspiring: Motivating to explore the exhibition & take a closer look at the objects
- Bringing all the senses into play: handling, smelling, touching, dressing up...
- Active experimentation: experiments, construction, assembling...
- Entertainment: games, fun, humour...
- Mental challenges: tasks, brain teasers, puzzles, creating sequences...

14. Are there other terms that come to mind when describing your special learning facilities?

Open mentions:
1. Pleasure of discovery.
2. Learning in a playful way, comprehending new things.
3. Social context of the work.
4. Make people think/ sharpening their appetite/ not expecting too much, less is more
5. Disclosing feedback to the public, so that visitors can read it (e.g. via post-it notes or drawings).

15. Do you regularly have people assisting individual visitors (not guided tours) in using the special learning facilities? If so, who is responsible?

- Educators/Trainers
- Museum guards
- Volunteers
- No assistance for individual visitors

16. If yes, how many hours per week?

Open mentions: 10, 20, 20, 3, 35, 6, 60, 3, 35, 100, 15 hours
17. In all cases time is needed for the maintenance and upkeep of the special learning facilities. Who is responsible and how much time is involved?

- Educators/Trainers
- Museum guards
- Volunteers
- No assistance for individual visitors

Members of Education Department: 10 indications, median 5 hours per month
Technical / IT staff: 12 indications, median 10 hours per month
Museum guards: 12 indications, median 6 hours per month
Others: 5 indications, median 10 hours per month

Open mentions under ‘Others’: Volunteers, curators, all, head of the museum.

18. Do you evaluate visitor reactions to the learning facilities? If yes, how do you evaluate them?

- Yes
- No

Yes

Open mentions under “Yes”:
1. By questionnaires.
2. Asking them.
3. Questionnaires.
5. All the spaces have books which visitors can leave their comments in regarding both the exhibition and the learning space.
6. By monitoring footfall at each station and observation.
7. Feedback card, visitors’ books, evaluation sheets.
8. Observation, questionnaires.
9. Questionnaires, observation.
10. Evaluations by visitors;
11. Immediate feedback after/during guided tours, experiences made by our museum guards, written feedback (’praise-and-blame’ notes).
12. Visitor observation forms filled in by trainees /interviews conducted by trainees.

19. Has it proved necessary for you to make changes in your special learning facilities after their completion? If so, why? (Multiple answers possible)

- Yes, owing to technical/practical reasons.
- Yes, owing to visitor feedback.
- Yes, owing to other reasons.
- No, no changes were made.
- Yes, the learning facilities have always been intended as temporary.
- Yes, owing to a change in focus.
- Yes, owing to change in museum’s priorities.

0 2 4 6 8 10 12 14
Questions to museums with ‘learning spaces’: (answers 1-3 see general questions to all museums in the beginning)

4. Can you give a brief description of your designated learning spaces (separate activity-based areas, not inside exhibitions)? Please also include a list of what interactive elements (regardless of whether analogue or digital) you offer your visitors, in order to support active learning. Why did you make the decision to develop a learning area which was separate from the exhibitions?

1. Terminal called ‘the country’s memory’: historical database, museum lab.
2. In the permanent exhibition: children’s world with facilities (where children can use stamps) and an exhibition area dedicated to children between the age of five and 12 (accompanying booklet in five languages); ‘Auberlin’s shrine’: children’s world for age of five and 12 (accompanying booklet in five languages); ‘Capital’ which is based around performance, communication, movement, expression, language, transient art.
3. Activity room for young visitors in certain temporary exhibitions.
4. Activity room for young visitors in certain temporary exhibitions.
5. The ‘House to Touch’ (Haus zum Anfassen, since 1999) encourages tactile-kinaesthetic, visual, and process-oriented learning and invites visitors to take an active part: It enables them to engage with furniture and appliances of a historical court building from around 1800 in the Osnabrück area.

As the art in the galleries evolves and changes continuously, so do our practical workshops, talks and events. The curriculum for excellence has encouraged the learning and access team to work in more radical ways, and evolves as it is evaluated continuously.

6. Microscope Centre for school groups and individual

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6. Microscope Centre for school groups and individual
36 37

visitors as well as societies/citizen scientists (with stereomicroscope and incident light microscope), enabling visitors to explore and experiment independently.

7. Exploring Workshop with study rooms and playrooms:
   • ‘Expedition office’ – ‘exploring lab’ – painting workshop – display wall
   • Field equipment – binoculars, projection of daylight, specimen, creative material, library, laptop

We provide interactive facilities inside the exhibition as well as in designated learning rooms. These rooms allow us to conduct our educational work with different target groups and without being interrupted or disturbed.

8. Exploring Workshop for visitors from the age of five onwards, with three study rooms and playrooms (expedition office – exploring lab – painting workshop), as well as a library, an experts’ forum and an exhibition area.
   • Educational facilities: original equipment and instruments (field equipment, binoculars, projector of daylight, books, etc.) and material from natural sciences, face-to-face interaction.
   • Few digital elements.
   • Designated learning spaces, as we need to be able to work on and develop specific topics with groups without any time constraints; it may require the highest concentration; individual contributions and achievements can be experienced as part of a bigger process – in the context of a museum, i.e. visitors gain insights into how institutions like museums (can) work.

5. Which group of visitors did you especially have in mind while planning your designated learning spaces? (1=low priority, 6=high priority)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Group</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Families with children between 6 and 12</td>
<td>&gt; 5.25</td>
</tr>
<tr>
<td>2nd</td>
<td>People with special needs</td>
<td>&gt; 4.70</td>
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<tr>
<td>3rd</td>
<td>Families with children under 6 years of age</td>
<td>&gt; 4.55</td>
</tr>
<tr>
<td>3rd</td>
<td>Adolescents</td>
<td>&gt; 4.55</td>
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<tr>
<td>3rd</td>
<td>Ex aequo: Adults</td>
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<tr>
<td>6th</td>
<td>Senior citizens</td>
<td>&gt; 3.30</td>
</tr>
<tr>
<td>7th</td>
<td>Migrants</td>
<td>&gt; 3.30</td>
</tr>
</tbody>
</table>

6. Who brought up the idea of creating designated learning spaces in the first place?

- Political mandate: 0
- Head of the museum: 3
- Education Department: 10
- Curator(s): 0
- Other: 1
- Open mention under “Others”: Scholars
- No answers: 2

7. Who is involved and to what extent are they involved in the actual planning of your designated learning spaces? (1=not involved, 4=very involved)

<table>
<thead>
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<th>Rank</th>
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<th>Score</th>
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</thead>
<tbody>
<tr>
<td>1st</td>
<td>Education Department</td>
<td>3.92</td>
</tr>
<tr>
<td>2nd</td>
<td>Museum Management</td>
<td>3.27</td>
</tr>
<tr>
<td>3rd</td>
<td>Exhibition Designers/Architects</td>
<td>3.00</td>
</tr>
<tr>
<td>4th</td>
<td>Technical/IT staff</td>
<td>2.89</td>
</tr>
<tr>
<td>5th</td>
<td>Curators</td>
<td>2.82</td>
</tr>
<tr>
<td>6th</td>
<td>Consultants</td>
<td>2.50</td>
</tr>
<tr>
<td>Other (open mentions): management, partner schools, other school labs</td>
<td></td>
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</tbody>
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8. Did you take into account the results of visitor polls in planning your designated learning spaces? If so, in what way?

- Yes: 6
- No: 4
- Not answered: 4
1. We monitor and evaluate audience figures, age, demographics, and how they heard about the activities.
2. Visitors asked for more active learning spaces, close proximity to gastro offers.
3. Experience of 40 years.
4. We conducted interviews (at the entrance and exit) in which we asked about expectations – fulfilled or unfulfilled.
5. Research conducted via school labs.

9. In planning your designated learning spaces, did you take into consideration any specific learning theories or learning types? If so, please specify in a few words.

Yes: 6
No: 2
Not answered: 6

Open mentions under ‘Yes’
1. Using the Curriculum for Excellence as a base; Visual, auditory, and kinaesthetic; Learning and Teaching Scotland, Glow, Engage; Visiting other learning spaces and galleries thought the world influences your decisions.
2. Active learning, free playing, small groups, getting actively engaged, etc.
3. ideas on independent learning; learning theories on experience and process-orientation; hands-on; insights of the psychology of perception
4. Research conducted via school labs

10. With regard to your designated learning spaces, how important are the following aspects? (1=not important, 6=very important)

1st: Inspiring: Motivating to explore the exhibition & take a closer look at the objects   > 5.22
1st ex aequo: Bringing all the senses into play: handling, smelling, touching, dressing up...   > 5.22
1st ex aequo: Active experimentation: experiments, construction, assembling...   > 5.22
4th: Entertainment: games, fun, humour...   > 4.44
4th ex aequo: Mental challenges: tasks/brain teasers, puzzles, creating sequences...   > 4.44

11. Are there other terms that come to mind when describing your designated learning spaces?

1. Vibrant, busy, cooperative, multi layered, continual learning for all!
2. Sustainability.
3. Trigering conversations within families or with trained staff of the museum.
   • Familiarisation with the cultural technique of museum visits
4. Socio-ecological learning; learning by imitating; experts as role models

12. Do you regularly have people assisting individual visitors (not guided tours) in using the designated learning spaces? If so, who is responsible?

Educators/Trainers:   6
Museum guards:   2
Volunteers:     0
No assistance for individual visitors:  0
Not answered:  4

13. If yes, how many hours per week?

Open mentions: 5 / 5 / 25 / 10 / 20 / 15 / 20 hours per week

14. In all cases time is needed for the maintenance and upkeep of the designated learning spaces. Who is responsible and how much time is involved?

Members of Education Department: 8 indications, median 20 hours per month
Technical / IT staff:    5 indications, median 10 hours per month
Museum guards:    5 indications, median 4 hours per month
Others:      1 indications, median 5 hours per month
Open mention under ‘Others’: volunteers.

15. Do you evaluate visitor reactions to the learning spaces? If yes, how do you evaluate?

Yes:   7
No:   2
Not answered:  3
Open mentions under ‘Yes’
1. Questionnaires.
2. Written responses on post-it notes, evaluation forms or staff members asking the audience for verbal feedback.
3. Questionnaires, observation.
4. Visitors’ books and questionnaires.
5. Sometimes as part of special events or courses, such as in-service training for teachers; feedback forms.
6. In some cases, through questionnaires.
16. Has it proved necessary for you to make changes in your designated learning spaces after their completion? If so, why? (Multiple answers possible)

1st rank: Yes, owing to technical/practical reasons.  > 5 indications
1st rank ex aequo: Yes, owing to visitor feedback.  > 5 indications
3rd rank: Yes, the learning spaces have always been intended as temporary.  > 3 indications
4th rank: Yes, owing to change in museum’s priorities.  > 2 indications
4th rank ex aequo: Yes, owing to other reasons.  > 2 indications
Open mentions: legal requirements; craft skills of participants are deteriorating  > 2 indications
6th rank: No, no changes were made.  > 1 indication
6th rank ex aequo: Yes, owing to a change in focus.  > 1 indication
Open mention: temporary exhibitions

Final question to all participants: What is your position in the museum?

Not answered: 41
Director: 8
Curator: 7
Head of Education Department: 13
Staff member of Education Department: 6
Other: 7

Authors’ biographical details

Sandra Malez was born in Klagenfurt (Austria) in 1976. She graduated at the Karl Franzens University of Graz, Austria in History and Art History. She worked as an art educator at the Kulturhaus of the City of Graz, the Universalmuseum Joanneum and the „Steirischer Herbst“ (Styrian Art Festival) and as an exhibition organiser at the Neue Galerie Graz at the Landesmuseum Joanneum. Since 2002 she is the Head of the Department for Art Education and Cultural Education at the State Museum of Upper Austria.

Manuel Heinl was born in Linz (Austria) in 1975. He graduated at the University of Vienna in History. Since 2007 he has worked as an art educator at the State Museum of Upper Austria and has developed education programmes for different audience groups in the museum as well as learning facilities.

Margherita Sani works at the Istituto Beni Culturali of the Region Emilia-Romagna, where she is in charge of European museum projects, in particular on museum education, lifelong learning and intercultural dialogue. She is on the NEMO (Network of European Museum Organisations) executive board and a member of ICTOP (ICOM Committee Training Personnel).