Can interactive installations be used as educational tools in museums?

by Moritz von Burkersroda

INTRODUCTION

Whoever went to the Louvre in Paris knows how strict security-restrictions are there. The visitor can count oneself lucky to gain more than a glance of the famous exhibit 'Mona Lisa' before getting told to step back from the painting again. The traditional museum's collection is well known one; there to be preserved as it is. Therefore allowing the visitor to touch them would be unthinkable.

'Do not touch!' signs, nevertheless, are unlikely to be found on interactive exhibits of younger museums like the Science Museum in London. Here, visitors are encouraged to get engaged with the countless interactive exhibits. This shows, that the role of the museum visitor has changed, nonetheless through interactive installations in museums.

Interactive means the "ability to intervene in a meaningful way" (Cameron, 2007), therefore they give a choice to the visitor, while and installation can be defined as "large piece of equipment installed for use" (Oxford University Press, 2012). Hence museums containing these interactive installations put the visitors into an active role. Visitors are encouraged to get engaged with the exhibits - completely contrasting the passive role given by traditional museums. What caused this change? And how does it influence the tasks expected of the museum, like for example the educational role, which seems to be "well-established"? (Hooper-Greenhill, 2000, p.1) This essay is going to discuss, if interactive installations can be used as educational tools in museums. It will do so by defining, what museums are, how learning takes place, and why interactivity can be useful for the learning process.

MAIN BODY

Former Director of Research Centre for Museums and Galleries, Eilean Hooper-Greenhill (2000, p.1), describes "the educational role of the museum" as "long-standing and well established". This leads to the conjecture, that there could to be a difference in the educational role of museums and other educational institutions, like schools. Otherwise they might not be able to coexist.

As a matter of fact, discussions about the definition of 'education' have led to the endorsement, that learning is not just taking place in formal educational institutions, but also occurs in informal locations throughout life. (Hooper-Greenhill, 2000) And museums are expected to be institutions encouraging life-long learning, which they do through their exhibits. (Hooper-Greenhill, 2000)

In order to answer, if interactive installations are encouraging learning, it is essential to know, how learning can be enabled. Looking at definitions of learning, it reveals two major learning theories: behaviourism and constructivism.

Behaviourism states, that learning is enabled through external stimuli. (van der Zanden, 2009) One of the most important researchers for this theory is B. F. Skinner (mentioned in Coon and Mitterer, 2010). His research on 'Operant Conditioning' states, that a response is followed by a consequence – an external stimuli. The consequence then has influence on the likelihood of that response being repeated. (Powell, Symbaluk and Honey, 2009) A reinforcement encourages a repetition, while a punishment reduces the likelihood of that response being repeated. Grades and detentions at formal educational institutions, like schools, exist in order to influence behaviours of students. Good grades reinforce a student to maintain their learning performance, while detentions punish the student with the

intention to avoid a repetition of inappropriate behaviour. This shows that behaviourism and learning at formal learning institutions surely are intertwined.

Constructivists take the view, that learning also occurs without external stimuli. (van der Zanden, 2009) Furthermore they criticised the behaviourist way of learning as "not always very effective" for life-long learning, which requires both: new knowledge as well as the use of existing knowledge. (Hooper-Greenhill, 2000, p.2) Learning takes place, if "existing cognitive structures become differentiated and coordinated". (Zajda, 2006, p.15) Zajda (2006) built up on this theory and emphasises two different types of learning necessary to enable this change in the cognitive structure: learning in the strict sense and learning in the broad sense. If the second follows the first, this might lead to a change in the cognitive structure.

This concept of constructivist learning theory can be explained through the interactive installation 'Noteput' (Jonas Heuer, 2009), which is described as making "learning the classical notations of music for children and pupils more easy and interesting". (Friedemann Heuer, 2012) By placing physical notes on to an interactive table with a note scale, the user gains tangible, auditive and visual feedback on his/her action. Note values are

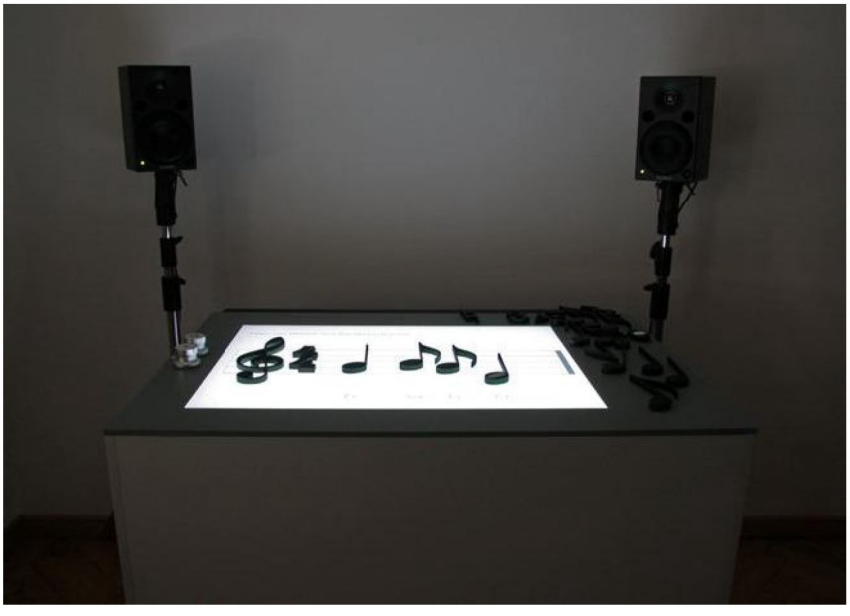

Figure 1: noteput1, n.d.

Figure 2: noteput11, n.d.

differently weighted, confirming the dissimilarities in the shape and the auditive feedback given by the speakers, when placing the notes on the note scale. Also, visual feedback is given by the name of the note appearing on the table beneath the notes.

Learning in the strict sense means confronting the learner with an experience, which he/she might not be able to explain with the existing knowledge – for example, how the visual language of notes work. The opportunity to experiment with the installation is given, as it is interactive – the user's choice will produce a reaction by the installation.

Learning in the broad sense takes place, if experimentation and reflection on the action enables the learner to create a concept to understand how the abstract language of notes might work. The next step to generate learning is done by connecting this concept to the learner's existing knowledge. Using various feedback methods reduces the gap between the learner's existing knowledge and the content, as it suggests a concept, which offers more freedom to link to: physically, auditive and visually. If this happens, the learner's existing cognitive structure eventually changes "qualitatively and permanently", therefore learning in a constructivist way takes place. (Zajda, 2006) Summarised, the learner makes sense of a new gained experience by connecting a mental concept to his/her existing knowledge, which then leads to constructivist learning, because it changes.

Compared to the behaviourist learning process, which basically copies and pastes knowledge from one individual to another, the constructivist learning process is much more focused on the individual. It does this by offering choice to the learner, which can be enabled through interactivity. Choice leads to freedom and control for the learner, which makes the learning experience more pleasant and enjoyable. Experiencing the content oneself and picking up the learner where he/she is, supplies more solid learning as knowledge becomes interlinked. This is because it scrutinises previous and gained knowledge by reorganising and therefore changing the existing cognitive structure.

Nevertheless, learning is not necessarily guaranteed if only learning in the strict sense takes place. This would mean the learner never reflects on the experience - therefore he/she might never construct a wider concept built on his/her action. If this is the case, the knowledge gained through the experience stays object bound, meaning it is useless for any situation outside the installation. Your cognitive structure would not change qualitatively, because there is no reason to question your previous cognitive structure. Simply knowing that different note shapes are physically differently weighted, would most likely make every musician shake their head as a reassurance not to have learnt anything about musical notations. Taking the learner further in the process to learning in the broader sense could be enabled by the installation by raising questions about the gained experience, suggesting concepts to understand make sense of it, or challenge the learner through setting goals.

The next case in which the learning process might then get interrupted is, if the learner is not able to connect the concept – constructed by learning in the broader sense - to his/her existing knowledge. This means that it is difficult to explain someone higher maths, if the learner is not even able to count yet. Therefore reacting on an individual learner level and adopting to individual learning speed is important. By explaining the concept visually, auditive and tactile in 'Noteput', it makes it easier to make the concent relate to the previous

knowledge. Coordinating and differentiating previous knowledge by adding new knowledge will eventually lead to the previous cognitive structure to change permanently.

Interactivity plays an important role in this learning process. Chris Crawford (2003), an interactive designer, used the visual metaphor of a conversation to describe the process of interactivity. He defines it as a "cyclic process, in which two actors alternately listen, think and speak". (Crawford, 2003) Using the installation 'Noteput', this conversation can be found constantly. From the beginning, where only a blurred clef on the table-board is visible, which hints on placing the physical clef there. If the user listened to this hint, understood it by thinking, and spoke back at the installation by placing the clef there, it is the table's turn to listen, think and speak. It does that through tracking the object's fiducial marker on the bottom of the physical clef, converting the information of the fiducial marker and its position into a visual signal. The visual signal, consists of an appearing note scale and the message 'Place the notes on the scale.' on the tabletop. The user would read this message, think about what kind of options he/she has, and maybe place a note on a desired spot. By doing so the user will also have a conversation with the installation in a tactile way; different note values are represented by different shaped and weighted notes. If the installation can track the fiducial marker on the table, it will convert its value and position

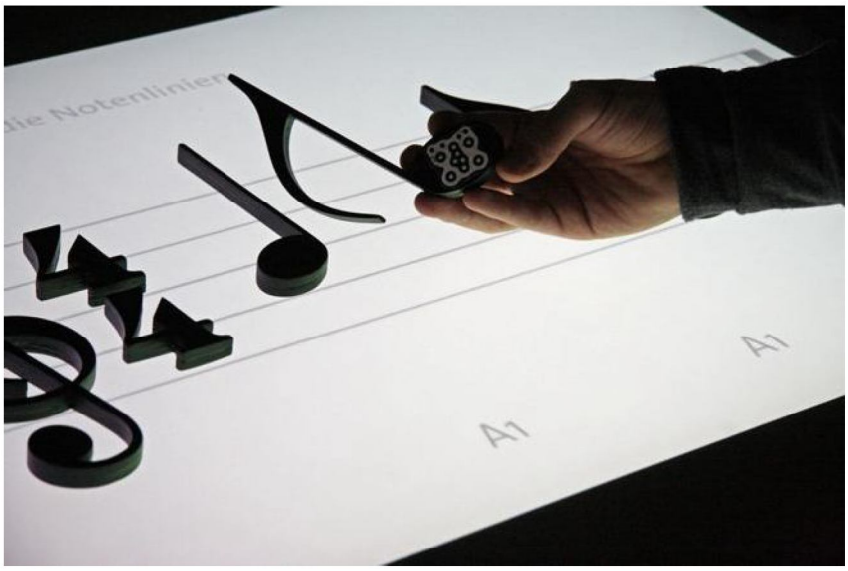

Figure 3: noteput5, n.d.

into audio and visual feedback. This can be listened to by the user again, and so on. As mentioned in the introduction, interactivity leaves choice to the user. Therefore it leaves freedom to the learner to experiment with the installation's different features: from a clef, to note scales, notes, note values, note names and its correlation towards other notes. And the installation responds at the learner's own pace. Interactivity enables the installation to adapt to different learner-levels in order to confront the user with a new, still digestible step-by-step.

So far it has been discovered, that interactive installations can be helpful for constructivist learning, which shows itself as an advantageous alternative to behaviourism. Now it's time to explain why this is beneficial for museums. First of all, it would be difficult to facilitate constructivist learning in formal educational institutions, as formal assessments, prescribed timetables and national curriculums restrain to focus on the individual learner, learner-level and speed. (Hooper-Greenhill, 1994) Museums, on the other hand, don't have these restrictions. This is why they are institutions expected to offer informal, life-long learning. Many museums took constructivist learning as a chance to fulfil their educational role in society, as well as attracting visitors by making learning – and therefore the visit - more fun. The so called 'Edutainment-', or 'Constructivist Museum' is a result of this shift in education and the consequential theories of learning. (Parry, 2010) As assumed, there is a difference in the informal educational institution museum and formal educational institutions, which is why they tend to use diverse learning theories to fulfil their educational role.

CONCLUSION

Summarised, interactive installations seem great tool for learning in a constructivist way. They are able to do so as they are giving choice to the learner, which makes the learning informal, therefore more enjoyable. By reacting to each individual choice the installation is able to adapt to their learner level and speed, which helps to ensure the constructivist learning process. Nevertheless, learning is not guaranteed just by giving choice, but needs to put the learner in a situation, where he/she is confronted with a new experience, then able to reflect on their action, as well as taking the gained concept further and beyond the installation.

Since museums – in contrast to schools – enable informal learning, they seem to be an ideal place to house interactive installations which support learning. The shift from the passive to the active visitor in a museum could have a positive impact on society and culture. It would not just change the perception of visits in museums, which would become more enjoyable; it would also have an influence on the relationship towards learning, which would become a different, more positive one. Museums could function like a rescue net, which covers the holes formal educational institutions can't fill, but also as an auxiliary encouragement to support the delivery of educational content in a different, more comprehensible way.

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IMAGES:

Figure 1:

[noteput1] n.d. [image online] Available at: <http://www.jonasheuer.de/wp-content/uploads/noteput1.jpg> [Accessed 26 Dec 2012].

Figure 2:

[noteput11] n.d. [image online] Available at: <http://www.jonasheuer.de/wp-content/uploads/noteput11.jpg> [Accessed 26 Dec 2012].

Figure 3:

[noteput5] n.d. [image online] Available at: <http://www.jonasheuer.de/wp-content/uploads/noteput5.jpg> [Accessed 26 Dec 2012].

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