

## II.3

# Learning and engagement in museum mediascapes

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Rapid developments in digital and mobile technologies have intensified what is historically a long tradition of material experimentation with display and communication in museum buildings and galleries (Brenna, 2014; Klonk, 2009). As encounters with collections are extended and distributed by such digital means as mobile devices, social media platforms, beacons and ubiquitous Internet access, distinctions between experiences of material and virtual displays and objects are becoming increasingly blurred. Kidd (2014) conceptualises these developments as *museum mediascapes*, and in recent years implications of new forms of museum communication and design have been explored from a range of perspectives (Drotner & Schröder, 2013). As with other sectors tackling the impact of emergent media developments on established practices and institutions, questions are raised about how museums may stay relevant for the communities and citizens they serve (Simon, 2010; Kidd, 2014), and how they may foster trust, diversity and democratisation through new forms of learning and engagement (Laws, 2015).

In this chapter, there is a focus on how opportunities for visitor learning and engagement are constructed in museum mediascapes and how these may be studied from a “meaning making” framework. The term “meaning making” (Wertsch, 1991) is used to highlight the significance of personal agency, identity and social interaction in processes of appropriating knowledge, and to make a distinction from the primary emphasis on mastering knowledge in specific subject domains, as in schools. Meaning making is proposed as a concept to frame studies of learning and engagement in museums, both because these are public spaces with collections and exhibitions of artefacts that are uniquely rich with meaning and signification, and because museums are frequently experienced as open-ended, interpretative cultural encounters (O’Neill & Wilson, 2010) by people without a specific learning agenda (Crowley, Pierroux, & Knutson, 2014). Moreover, although school field trips to museums are often framed by formal learning goals, studies also point to the significance of students’ out-of-school literacies when digital media and tools are introduced as learning resources in field trip activities (Bakken & Pierroux, 2015; Pierroux, Krange, & Sem, 2011). The concept of meaning making thus provides a lens for studying more broadly the ways in which digital media and other cultural tools engage visitors in exhibitions in museum settings, without being constrained to formal/informal learning classifications. Interestingly, the idea that museums are ideal “test beds” for innovative media design aligns with greater policy focus on the museum’s societal role as an educational institution and

increased professionalisation of museum curators specialising in education (Crowley et al., 2014; Dobbs & Eisner, 1987). In the museum sector, education curators are thus challenged to develop an expanded and updated view of knowledge, learning and learners (Bevan & Xanthoudaki, 2008), prompted not least by developments in digital content, social media and their use in designing learning experiences for gallery settings, interactive websites and online archives.

A particular challenge for learning and the “educational turn” in curating (O’Neill & Wilson, 2010) is competition for wilful, voluntary attention (Leont’ev, 1994; Vygotsky, 2004). Voluntary attention, or what Lawson & Lawson (2013) call attentional engagement, is understood as culturally developed and entails an experience of exertion that flows from the mastery and control of attention (Leont’ev, 1994). Given today’s globalised and ubiquitous access to information and entertainment, the audience’s ability to produce or withdraw attention is an important curatorial and design consideration in museums. For this reason, museum mediascapes are ideal sites for exploring how encounters in art, cultural heritage and science museums facilitate attentional engagement and other skills needed for learning in the 21st century, such as planning, implementing and evaluating one’s own learning processes, and being inquisitive and persevering in self-directed learning (Ludvigsen, 2015). Importantly, these skills are not only related to educationally framed academic subjects but are part of what Erstad, Gilje, Sefton-Green and Arnseth (2016) term “learning identities.” This concept describes the ways in which interests, knowledge and engagement become activated and facilitated in ways that are significant for learning trajectories throughout a lifetime. This chapter aims to clarify the importance of museum mediascapes as arenas for educational research on learning identities and the development of 21st-century skills.

The meaning making framework, presented in detail below, is developed to explore the main question posed in this chapter: how do features of museum mediascapes construct opportunities for visitor learning and engagement? The theoretical framework draws on sociocultural research and findings presented in a recent review of learning research on engagement (Lawson & Lawson, 2013), in which three types of engagement are identified: cultural congruence, cultural correspondence and cultural relevance. I use this framework to relate key developments in museum mediascapes – in art, science and history museums – to the study of meaning making in these settings.

## A perspective on meaning making

### *Sociocultural roots*

Visitors become engaged and attend to features in museum exhibitions when these are experienced as relevant, whether alone or as part of sharing experiences in a group (Leinhardt & Knutson, 2004). In her new book, *The art of relevance* (Simon, 2016), American researcher Nina Simon refers to two key aspects of relevance theory from a “cognition and communication” perspective (Wilson & Sperber, 2004) to discuss how museums might better address the challenge of engaging audiences in learning activities and museum events more broadly. According to this theory, Simon explains, relevance is achieved when the communicative intention 1) stimulates positive cognitive effect through information that yields “new conclusions that matter to you” and 2) is obtained and absorbed through the least amount of effort (Simon, 2016, p. 32). To “matter,” then, involves a process with affective and cognitive dimensions that make it possible to build on previous knowledge, in the sense of cognitive change or learning something new. Simon extends these general principles in relevance theory to form a broad framework to discuss museum projects, many of which are oriented toward fostering large-scale community

engagement. However, as a theory primarily concerned with mapping interpretation from a single speaker's informational intentions to a single hearer's comprehension (Wilson & Sperber, 2004), it does not address the analytical challenge of understanding how relevance is constructed through participation in social structures and institutional settings.

It is in this regard that a sociocultural approach augments notions of relevance based on classic conceptions of affective and cognitive engagement, by allowing one to relate individual psychology to sociohistorical contexts or "activity settings" (Wertsch, 1985). Sociocultural perspectives were introduced in museum learning research in the late 1990s (Hein, 1998; Schauble, Leinhardt, & Martin, 1997) and have since gained broad acceptance, introducing new areas of inquiry into the role of physical contexts and social interaction for meaning making in museums. Sociocultural approaches focus on mediated human activity, whereby analyses include the cultural and social organisation of the context in studies of learning. Vygotsky's (1978) "general genetic law of cultural development" situates the very genesis of thought-language relations in the social plane:

Any function in the child's cultural development appears twice, or on two planes. First it appears on the social plane, and then on the psychological plane. First it appears between people as an interpsychological category, and then within the child as an intrapsychological category. This is equally true with regard to voluntary attention, logical memory, the formation of concepts, and the development of volition. (Vygotsky, 1978, p. 57)

Applying Vygotsky's genetic approach to the study of museum mediascapes directs attention to how digital resources, museum settings and social practices (sociogenetic level) mediate visitors' learning and engagement (ontogenetic level). What are the meditational features of museum mediascapes, and how do these features structure opportunities for visitor learning and engagement?

### *Sociocultural studies of engagement*

In their review of learning research on engagement, Lawson & Lawson (2013) use this genetic approach to organise their discussion of studies that include "sociocultural indicators of engagement." Although the studies reviewed have primarily examined student engagement in higher education, the findings are relevant for this discussion. First, they identified studies of engagement that focused on interaction as it unfolds on a "second by second" basis, or on a microgenetic level. Lawson & Lawson (2013) explain engagement at this level as cultural congruence: "the degree to which students experience support for their social-cultural and personal identities *while participating* in activity" (p. 446). It is at this level that media designs support attentional engagement requiring minimal effort. A second sociocultural indicator of engagement identified is termed cultural correspondence. This is engagement specifically linked to learning, and "the extent to which a particular task, activity, or setting socially and/or cognitively activates and/or connects with students' prior knowledge and experience" (Lawson & Lawson, 2013, p. 447). Studies of visitors' learning in museum exhibitions using media that distinguish between different levels of expertise would be an example of how this concept could be applied analytically. The third sociocultural indicator of engagement identified in the research is termed cultural relevance, which ties the experience of an activity's personal significance (it "matters" emotionally and cognitively) to one's sociocultural background. This activity aligns with and supports an individual's identity construction and lifelong developmental trajectory. From a learning perspective, cultural relevance might be experienced through media platforms that support personalisation and identity-building over time and in a community.

Importantly, in contrast to engagement research on mental processes that presumes a temporal sequence of context→motivation→engagement→outcome, a review of findings from sociocultural studies suggests that contexts mediate engagement in “a complex and nested arrangement of social-ecological features and processes” that may differ according to subpopulation and institutional features (Lawson & Lawson, 2013, p. 444). Such nested features include engagement with “various tools/objects/technologies (e.g., computers), tasks (e.g., labs/assignments), activities or disciplines (e.g., dance or math), people (e.g., peers, teachers, coaches) and places/social settings (e.g., school or community agency)” (Lawson & Lawson, 2013, p. 444). By closely analysing visitors’ interactions in museums as they unfold, it is possible to unpack how these levels are connected (Maxwell & Chmiel, 2014).

In the section below, I present a framework for understanding how museum mediascapes, as activity settings, structure visitor engagement at these different levels: cultural congruence, cultural correspondence and cultural relevance. References to recent studies of museum media designs are used to illustrate the concepts rather than for systematic review purposes. Following this, interactional data from an empirical study in a national art museum are analysed applying the multilevel framework.

## Sociocultural indicators of engagement

### *Cultural congruence*

Linked to research on attentional engagement (Lawson & Lawson, 2013), cultural congruence is important for learning in museums in that visitors “become actively engaged in learning the moment an artifact or museum object attracts their interest” (Banz, 2008, p. 50). To understand how museum mediascapes may be organised to support *meaning making* through cultural congruence, Steier (2014) collaborated with a national art museum in an experiment involving posing and taking “selfies.” The threshold for participating in this activity was hypothesised as low because it was culturally congruent with everyday practices. Visitors first noticed a feed of digital photographs on a screen mounted on a gallery wall that depicted other visitors “posing” like artist Edvard Munch in his different self-portraits. As they walked toward the interactive station, their own images appeared on a screen, triggering attention and interactions with the camera before engaging in the posing activity.

In keeping with the meaning making aims for the media design, the study found that visitors closely observed and discussed expressive and formal characteristics of Munch’s self-portraits as they carefully positioned themselves and compared different bodily and facial expressions for the picture. In this art museum mediascape, then, the act of participating in the posing activity, as a form of embodiment, fostered meaning making (Steier, 2014). However, it is important to note that, in contrast to Steier’s art museum study, a frequent finding in science museum studies is that visitors engaged in hands-on exhibits have problems learning scientific concepts (Allen, 2004; Atkins, Velez, Goudy, & Dunbar, 2008; Gutwill, 2008). This suggests that facilitating engagement in museum activities that have specific learning goals also entails designing tasks, activities and settings in ways that are sensitive to the disciplinary domain and correspond with visitors’ prior knowledge and experience, whether alone or in groups. This is discussed below in the section on cultural correspondence.

In museum mediascapes, sociocultural indicators of engagement as cultural congruence are not constrained to interacting with a screen interface. In fact, there is extensive research on bodily and sensory interactions with objects and exhibits in all types of museums, and European Union research programs have consistently funded projects that experiment with “future”

technologies and new paradigms of computing in digital cultural heritage that create interactive environments and spaces for visitors without being tied to the desktop, laptop or similar “fixed” metaphors of the computer. Based on a “natural interface” metaphor (Weiser, 1994), interfaces may be designed to more or less “disappear” during use, whereby gestures and motions seamlessly mediate interactions between human beings, machines and their environment. The idea is that eventually, as with “touching” or “swiping,” new human–computer interactions become part of a natural vocabulary of gestures. Responsiveness and different forms of feedback give a sense of control, maintain focus and continue the interaction (Hirsh-Pasek et al., 2015). Human–computer interaction (HCI) research thus frequently attends to microlevel engagement in the design of user experience interfaces for museum settings, including monitoring and adapting the influence of external stimuli–devices on visitors’ interactions in exhibition settings. These developments are increasingly used in the growing field of learning analytics and the design of digital learning platforms that provide continuous feedback to promote self-regulated learning, a central “future learning skill” (Ludvigsen, 2015).

Augmented reality experiences using overlay technologies, and virtual reality using 3D simulations and environments, are examples of emerging technologies being designed to provide rich sensory experiences that can adapt to visitors’ moment-by-moment engagement. In the project ARtSENSE, visitors wore headsets and used natural gestures to interact with multi-sensory content designed to augment exhibitions (Damala et al., 2013). The experimental system monitored visitors’ engagement using different data, including 3D gaze point computation (Hammer, Maurus, & Beyerer, 2013) and physiological responses (biosignals like heart rate, breath rate, skin conductance level) to “obtain the psychological state of the visitor and determine the level of interest with regards to what the visitor is looking at, or listening to but also in order to determine when a visitor is disengaged” (Damala et al., 2013, pp. 125–126). At this stage of development, “engagement” in such technology-driven experimentation is far from naturally occurring; however, aims of cultural congruence seem central to this trend in the design and research of future museum mediascapes. In terms of meaning making, it is important to note that actions at this microlevel are always embedded in “a complex and nested arrangement of social–ecological features and processes” (Lawson & Lawson, 2013, p. 444), among which are the tasks and resources specifically designed to foster learning in museums. In sum, mediascapes construct opportunities for engagement as cultural congruence through designs that trigger interest and support personal and sociocultural identities *while participating* in an activity.

### *Cultural correspondence*

In museums, the design of learning activities often draws on formal education perspectives and resources. There are historical and practical reasons for this, due not least to the teaching backgrounds of many museum educators and the historical practice of school field trips, which commonly employ worksheets as learning resources (DeWitt & Storksdieck, 2008; Kisiel, 2003). Research on worksheet and fieldtrip practices continues to inform the pedagogical design of media use for learning activities in museums. Mobile applications for mystery games are frequently modelled on inquiry learning approaches, for example, prompting visitors working in groups to formulate scientific questions and hypotheses, make observations, collect evidence and communicate findings (Gutwill & Allen, 2011; Klopfer, Perry, Squire, Jan, & Steinkuehler, 2005). Making videos using cameras in mobile devices is an example of how “multimodal worksheets” may be designed to engage students in learning activities. A study by Bakken & Pierroux (2015) in a science museum found that video tasks designed for a field trip were effective in orienting students toward the scientific principles conveyed in

exhibits and in integrating the exhibits as learning resources. Importantly, the video tasks were carefully designed and tested to also correspond with school curriculum and pre-post visit lessons. The study found that the performative and collaborative activity of making a short video mediated the ways in which conceptual understandings were proposed, challenged, negotiated and eventually revised in the group. In the study presented below, the aim was to similarly explore how established pedagogical principles might be extended based on features and developments in museum mediascapes.

Outside of school field trips, it is frequently argued that it is impossible to control for variation in visitors' previous knowledge and individual learning skills in museum settings, and thus to design for cultural correspondence. Mediascape designs should instead support visitors in taking control of their own learning processes based on what they know or believe about themselves and their knowledge, "recognizing when they understand and when they need more information" (DiSalvo, 2016, p. 4460). Designs to support learning and engagement in complex museum mediascapes are thus increasingly intertwined with developments in technology-enhanced learning (TEL). Museums are included in Scanlon's (2012) typology of areas in which research interests in TEL and informal science learning overlap, and she highlights the role of artefacts and activity in TEL designs that support "remembering and sociality." A clear overlap with TEL research is the design and study of sophisticated systems, particularly for mobile devices, in which content presentations and tasks adaptively correspond to visitors' varying levels of interest or expertise in subjects or exhibition themes to sustain engagement. This may be accomplished through "hint systems" that provide information on cue, scaffolding for different levels of skill in game play, or personalised narratives modelled on visitors' behaviours or profiles. Working with curators, focus groups and learning scientists, often in participatory design processes (Mason, 2015), designs are "concerned with the idea of adapting the selection or presentation of information to a visitor's interests or learning style" (Fosh, Benford, Reeves, & Koleva, 2014, p. 632). Engagement in the form of cultural correspondence is thus achieved by constructing opportunities in the mediascape for bridging or closing knowledge gaps on different levels.

### *Cultural relevance*

Museum mediascapes that engage through cultural relevance are experienced as significant on a personal level and resonate with a visitor's socioeconomic and cultural background and interests. In the past decade or so, in keeping with general trends in media strategies in organisations and institutions, social media platforms are often at the core of museums' communication approaches to engage the public in broader societal issues. Social media are recognised for establishing new interactions between museums and visitors, from "liking" and "following" museums' Twitter and Facebook posts to more committed forms of engagement, such as crowd-sourced "transcribing" and "tagging" activities in collection management systems and digital archives as part of citizen science or citizen humanities projects. Studies have found that these new forms of engagement are strongly linked to participants' experiences of the activity as personally and culturally relevant (Eveleigh, 2015; Hetland, 2014; Hillman & Säljö, 2016).

Social media sites also provide museums with data on users' preferences, profiles and behaviour patterns. Nevertheless, as Simon (2016) points out, the success of curatorial approaches to make museums relevant for visitors seems impossible to predict, even when building on audience research and established museum-community relationships. Armed with knowledge or assumptions about what may be culturally relevant for their audiences, museum staff may experience outreach strategies using social media as a kind of "hit-or-miss" approach to engaging



visitors in museum collections, events and exhibitions. As discussed in the study presented below, researchers and curators have collaborated to explore how dialogical features of social media may be incorporated into museum settings to make content more relevant in visitors' interactions with exhibitions. In a different study, university researchers and curators at an art museum invited visitors to use social media to "write their own labels" with the aim of creating personal relevance (Parry, Ortiz-Williams, & Sawyer, 2007).

Supporting a sense of personal relevance, which emerges from an individual's cultural and socioeconomic background, also underlies aims of designing adaptive features on guided tour applications for mobile devices. Some delivery systems purposefully integrate the social context of a museum experience, by allowing visitors to design paths and tours as "gifts" for others who might share their interests. Fosh et al. (2014) speculate that "personalization algorithms may be able to learn from the examples of deep personalizations that humans make when gifting" (p. 632). Objects and narratives of personal relevance and interests are collected and shared, providing emotional and aesthetic counterpoint to authoritative interpretations in museum exhibitions.

### *Applying the framework*

To explore how this framework may be applied to the study of engagement and meaning making in museum mediascapes, video recordings of visitors engaged in an "interactive activity" are analysed below. The data were collected in connection with a larger research project in which visitors engaged in mediascape activities in a gallery at the National Museum of Art, Architecture and Design in Oslo in 2013. The content, themes and activities were developed in a research-practice partnership that included museum curators, designers, programmers and learning researchers. The shared aim of the project was to better understand how to design social and digital media to support art interpretation in a museum setting (Pierroux & Ludvigsen, 2013).

The curatorial aim of the activity analysed below, titled "My friends," was to engage visitors in exploring the historical and social context of artist Edvard Munch's life: the relationships and friendships that influenced him, as well as their beliefs, interests, writings and artworks. The content specifically centred on Munch's association with artists and writers known as the Kristiania Bohemians, who initiated a political and cultural movement in Kristiania, the capital of Norway in the 1880s (now Oslo). A "manifesto" produced by the artists in 1889, titled *Nine commandments*, was selected by the curator as a text that illustrated how unconventional the views of this group were for the times in which they lived. A copy of the commandments was placed at the centre of a table for visitors to read (Figure II.3.1). In front of each chair at the table was the profile of an artist from the Kristiania Bohemians: Edvard Munch, Hans Jæger, Oda Krogh and Christian Krogh.

In addition to sitting and reading about Munch and his friends, visitors could read an invitation to "tweet a tenth commandment for your friends" using the *Twitter* app installed on a digital tablet attached to the table. *Twitter* was selected as the social media platform for the activity design because of its specific dialogical features. Tweets can express immediate reactions to events or statements, in the sense of primary speech genres, and they can also serve as utterances that respond to other texts and discourses, especially through the use of hashtags, to create a kind of meta-text (Rulyova, 2017). Finally, tweets correspond with the grammatical form of imperative sentences, as in "commandments." Visitors' posts were visible in a live feed on a wall-mounted screen at the head of the table (Figure II.3.2) and also appeared on the museum's website and *Facebook* page. A more thorough account of the learning design aims for the activity has been previously described (Pierroux & Ludvigsen, 2013).



Figure 11.3.1 “My friends” activity table in experiment room.

### *Methodological approach*

The research team recruited friends (17–18 years old) at an international baccalaureate program in Oslo to participate in an observational study of a museum visit. Eight small groups participated, consenting to the terms of the study in keeping with ethical guidelines. At the museum, each group was instructed to attend to exhibits in the manner most natural to them, with the provision that they visit the interactive gallery where the “My friends” activity was situated at some point during the visit. Three randomly selected groups were followed and video recorded by researchers during their entire visit, in keeping with methods from interaction analysis (Derry et al., 2010; Jordan & Henderson, 1995). The young people were Norwegian but spoke English





Figure II.3.2 Multimodal resources included Twitter feed, tablet, texts and pictures.

during this visit, as was customary in their study program. The recordings were transcribed, and two excerpts from one group’s interactions with the “My friends” activity are presented below. Parts of this data have been analysed in a different study (Gjone, 2015).

The excerpts were selected from recordings of two young women, named “Clara” and “Helene” for this analysis, toward the end of their two-hour museum visit. The conversational tone and exchanges in the excerpts are in keeping with the overall pattern of talk between the women during their visit. The two excerpts were selected from a sequence of interaction lasting approximately ten minutes to study how the tasks, resources and media constructed opportunities for engagement and meaning making. We enter the data as “Clara” and “Helene” approach the “My friends” table.

*Excerpt 1*

- 1 Clara: Should I tweet? (taking a seat)
- 2 Helene: (also seating herself) It is ... you have to do it in Norwegian.
- 3 Clara: The Bohemians' *Nine commandments*? Eh ... (reading). Oh, and they almost made it into this kind of punk thing (moves the tablet in front of her).
- 4 Helene (laughing and reading task): Oh, you should, like, tweet. Twit. From your own life (looks at the instructions). Right?
- 5 Clara: Uh-huh. (Helene leans over the table and reads the instructions. Clara observes and points to several words).
- 6 Helene: Can you ... he ...
- 7 Clara: Oooh.
- 8 Helene: Ok, so you are supposed to be ... you're him. And I'm this guy (looking at artist profile in front of her).
- 9 Clara: Wait (reading commandments), they hated people like Bjørnstjerne Bjørnson?
- 10 Helene: (shrugs shoulders) That's one of the rules.
- 11 Clara: It says, you're not supposed to ever regret ... (points to a different commandment) "You shall *take your own life*" [italics in original]. Does that mean they should commit suicide?
- 12 Helene: Yeah. It does.
- 13 Clara: Munch did not commit suicide.
- 14 Helene: He didn't?
- 15 Clara: No, he died of, like, pneumonia or something?
- 16 Helene: (shrugs shoulders) Ok. But maybe he tried or planned to commit suicide.
- 17 Clara: Ok. Who are you?

In this excerpt, Clara's attentional engagement is triggered by the invitation to "tweet." Her interest, ease and willingness to participate indicate that the activity is culturally congruent with her use of social media, her personal identity and her idea of what counts as natural behaviour in a museum, as she and Helene immediately seat themselves at the table. Their engagement is sustained while reading the artist biographies in front of them, and the *Nine commandments* on which the tweet activity is based. However, the women are confused about their roles and whose "voice" should be used to write the tweet. The confusion is caused by having an artist's picture and biography before them and the ambiguity in the wording of the task "tweet a tenth commandment for your friends." Understanding the task is a large part of what students do in school (Rasmussen, Krange, & Ludvigsen, 2003), and in this sense, their engagement in negotiating the "correct" approach to the task may be understood as oriented toward cultural correspondence.

However, the task is not the sole focus of interest, as they also express curiosity about the meaning of the different commandments and how to interpret them. This engagement with content may also be understood as cultural correspondence, in that they are clearly able to draw on previous knowledge to make sense of the texts. Clara's surprise at the commandment, "You shall hate and despise all farmers, such as Bjørnstjerne Bjørnson," is linked to her knowledge of Bjørnson as one of Norway's most famous authors from this time. She shows similar surprise when questioning the meaning of the ninth provocative commandment: "You *shall* take your own life" (emphasis in original text). Clara links her reflections on this commandment to Munch, noting that he died from sickness rather than by suicide. In sum, sociocultural indicators of engagement are apparent while the women are participating in the activity (cultural congruence) but also in the extent to which the task, activity and setting activate and connect with

Clara and Helene's prior knowledge (cultural correspondence). The second excerpt transpires a few minutes later, as Clara is taking her turn at the tablet.

### Excerpt 2

- 1 Clara: Ok, I tried ... to make one ... that fits (moves tablet toward Helene).
- 2 Helene: "You shall live in the moment" (takes a picture of it while Clara types).
- 3 Clara: I wanna go online and remove the tweets. I wanna write them in *nynorsk* [new Norwegian].
- 4 Helene: Nooo. You know they were against *nynorsk*.
- 5 Clara: I don't care. I'm making my own.
- 6 Helene: Hey, you can't write like a "commandment" in *nynorsk*. There's more to it than that. Like, I write in *nynorsk* and then you write –
- 7 Clara: No, I like *nynorsk*. Do you say *levar* or *lever* [living]?
- 8 Helene: *Lever*.
- 9 Clara: *Lever*.
- 10 Helene: You're supposed to represent them.
- 11 Clara: No, I'm supposed to represent my friends.
- 12 Helene: Nooo
- 13 Clara: Or me.
- 14 Helene: That guy.
- 15 Clara: Yeah, that says. No, it says make a tenth whatever that suits your friends.
- 16 Helene: Make for my friends? (reads the paper while Clara types). You're writing a tenth commandment for the Christiania Bohem (puts paper down). Get it?
- 17 Clara: How do you know?
- 18 Helene: Cuz they hated it. That's why they hated Bjørnstjerne Bjørnson.
- 19 Clara: Bjørnstjerne Bjørnson had something to do with *nynorsk*?
- 20 Helene: Yes.

In this excerpt, tensions between mastery and appropriation come into play in the meaning making process and are linked to social media and the use of multiple resources in an interesting way. Clara's reasons for wanting to write in *nynorsk* are unclear. As one of two official written forms of Norwegian, this is a compulsory subject in school that is hotly debated by Oslo students. Many students consider the language irrelevant and difficult to learn. Moreover, *nynorsk* has always had political overtones, intertwined with nation-building by paying homage to Norwegian roots in nature and rural life. In arguing that she is writing for herself and her own friends and should thus be able to choose the language, Clara indicates that there is something personal at stake in her plan to write tweets in *nynorsk*, strongly related to her identity as knowledgeable in *nynorsk*. In the face of new knowledge presented to her about the Christiania Bohem's disdain for both Bjørnson and *nynorsk*, Clara's engagement wavers between "appropriating" the task by making it her own, or "mastering" the task as Helene interprets it based on the resources available. Applying the analytical framework, then, Clara's engagement may be understood in terms of cultural relevance, in that the experience of personal significance (it "matters" emotionally and cognitively) seems to have some connection to her background and identity construction.

Summing up, applying the analytical framework to the excerpts above made it possible to "zoom in" on the *My friends* mediascape and study how features of the activity constructed opportunities for engagement and meaning making on different levels. Indicators of cultural congruence were found in Clara and Helene's attentional engagement, which was triggered and

then sustained by the “write a tweet” activity. As discussed above, engagement at this microgenetic level is linked in sociocultural research to the experience of support of social and personal identities while participating in an activity. Indicators of cultural correspondence were identified in Clara and Helene’s engagement in understanding both the task and the art historical information about Munch and his friends. Engagement at this ontogenetic level is linked in the research to the ways in which specific tasks, disciplines or settings activate or connect with prior knowledge and experience to support meaning making. Finally, at the sociogenetic level, indicators of cultural relevance were seen in how differing approaches to the activity were disputed and took on personal significance for each of the women, with engagement linked to issues of identity and sociocultural background. As opposed to modelling engagement as a temporal sequence of mental operations, then, the sociocultural framework supported the analysis of how the nested semiotic, disciplinary and social contexts (i.e., texts, tablet, social media, peers, art history, task, setting) mediated Clara and Helene’s meaning making.

### Mediascapes and meaning making

Museums may be considered media producers (Kidd, 2014) in the sense that visitors seldom experience unconstructed and unmediated encounters with museum objects and narratives, whether digital or physical (Bradburne, 2008). In parallel with media productions for exhibitions by museum curators with disciplinary expertise, computer scientists and learning researchers have used museums as “sites” for design experiments, testing and developing digital prototypes and for studying informal learning and expert practices (Roberts, 1997; Macdonald, 2002; Pierroux et al., 2007). Interests among interaction designers and technology developers have centred on testing hypotheses about user experience and the affordances and constraints of specific features of devices and media formats, such as mobile content delivery systems, interactive tabletops, augmented reality platforms and immersive environments. Learning researchers, alternatively, have focused on how new technologies may facilitate meaning making for different types of visitors and the advancement of pedagogical design principles and practices.

Given that these respective fields mutually inform the research and design of museum media, projects increasingly involve multidisciplinary teams – including museum partners – working together in a purposively reflective way. As described in the case and sections above, explorations in museum mediascape designs are increasingly cohering in multi-professional collaborations, with learning researchers, museum curators and interaction designers working with shared – but also distinct – interests and skills to produce innovations and rich visitor experiences in different settings (Jornet & Jahreie, 2013; Pierroux & Steier, 2016). These collaborations are producing new methods and practices, often involving visitors, participatory approaches and museum-initiated prototyping spaces (Mason, 2015; Pruulmann-Vengerfeldt, Tatti, Runnel, & Aljas, 2014) to create opportunities for visitors to learn and experience meaningful encounters with art, science and cultural heritage in museum mediascapes. Looking forward, studies of such multidisciplinary research teams will provide insight into how innovation in museum media challenges organisational values, visitor and learning perspectives and the expertise of designers, curators and researchers.

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