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“Move over, I will find Jerusalem”: Artifacts in game design in classrooms

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Abstract

When game design is conducted in classrooms as a learning activity, the students usually have digital, as well as traditional, artifacts available. This article looks at how students organize the use of different artifacts when creating computer games about historical topics. The data informing this article consist of video data collected from one sixth-grade class and one seventh-grade class in Norway. A sociocultural perspective is used to show how the students use a combination of different artifacts as resources in the game design process, focusing on how students take epistemic stances and how the artifacts are given different epistemic status. The students jointly construct knowledge that they then integrate into computer games using artifacts such as textbooks, world maps, Google, and timelines. The article shows how designing games about historical topics is a complex process in which students use artifacts as the basis for knowledge claims and storytelling, and students need to negotiate and balance their own design preferences with historical accuracy and the expectations of the classroom setting.

Keywords: game-based learning; artifacts; computer game design; epistemic stance

1. Introduction

When new technologies—such as radio, TV, and computers—have been introduced into school classrooms, discussions often have followed about how such new technologies would drastically change the way we see, understand, and organize education and learning (McLuhan, 1964; Tapscott, 1998). This discussion also has been the case for computer games (Gee, 2007; Prensky,

2001). However, computer games can be utilized for educational purposes not only through play but also by letting young people design their own computer games (Kafai & Burke, 2015, 2016).

The present article unpacks the activity of game design in an elementary school classroom to investigate how students work on a task in which they must use information and communication technology (ICT) but within a subject—in this case, social studies—in which traditional learning resources remain prominent. We set out to explore how students participate in the learning activity of designing computer games, in a formal learning setting where constructing and displaying knowledge about history is central. We seek to understand how students use different artifacts in the process of designing computer games, what epistemic status these artifacts are given, and how the use of artifacts contributes to the students' construction of knowledge. This is explored through the following research question: What artifacts do students use, and *how* do students use these artifacts while designing history-themed computer games in the classroom?

1.1 From using to designing games

Computer games increasingly are being used for learning topics, such as social studies and history. Games can be used to model complex situations in the real world (Gee, 2007), such as the Middle East conflict in *PeaceMaker* (ImpactGames, 2007), climate change in *Fate of the World* (Red Redemption, 2011), and the reasons for poverty in *Ayiti: The Cost of Life* (Global Kids & GameLab, 2006) and *3rd World Farmer* (3rd World Farmer Team, 2005). The game *This War of Mine* (11 bit studios, 2014), in which the players assume the roles of civilians in a war, has elicited critical and public acclaim and is sold on multiple platforms (Darvasi, 2016).

Games also can be used as *representations of the past*, giving players opportunities to interact with historical settings (Schrier, 2014). Such games have been used successfully to teach history, for example, bringing the civilization-building history game *Civilization III* into a high school classroom, in which students “developed familiarity with game concepts and deeper understandings of relationships among history, geography, economics, and politics” (Squire & Barab, 2004, p. 505). Games about historical topics allow players to immerse themselves in the past and speculate about what could have happened under different circumstances (Simons, 2007; Uricchio, 2005). Unlike books, games also have the advantage of being interactive. Instead of merely reading about a historical topic or time period, you can experience it through the game,

and possibly alter the outcomes of historical events. However, historical content in games should be balanced with fun and engaging gameplay (Schrier, 2014), which might be a challenge for game designers.

Software advancements have made it more accessible for game players to create games using technologies such as *Scratch* (MIT Media Lab, 2017), *Kodu* (Microsoft Research, 2017), and *RPG Maker* (Enterbrain, 2011), thus creating the possibility for young people to learn not only from playing games made by others about history but also by creating games while engaging with curricular content, constructing knowledge, and integrating it into the games (Kafai, 2006). Although introducing game design as a learning activity in classrooms often has focused on learning programming (Hayes & Games, 2008; Kafai & Burke, 2015), utilizing software that allows for easy creation of game worlds, characters, and narrative content shifts the focus to other aspects of game design. It has been argued that game design involves “a rich array of knowledge and skills,” including problem solving, art, writing, and storytelling (Salen, 2007, p. 305), and that game designers must think actively about the content they are implementing in games (Kafai & Burke, 2016). These aspects have been discussed as relevant to primary and secondary education in Western countries (Gee, 2007; Kafai & Burke, 2015, 2016; Peppler & Kafai, 2007; Selander, 2008).

Creating games has been seen as a method for students to learn “21st century skills” (Birmingham et al., 2013; Kafai & Burke, 2015; Salen, 2007), or as a way for young people to become critical players of games and active producers and participants in today’s media culture (Kafai & Burke, 2015, 2016; Peppler & Kafai, 2007). Many studies have been conducted outside classroom contexts, such as studies on learning programming or computer skills in after-school programs, youth clubs, or summer camps (Denner, Werner, & Ortiz, 2012; Maloney, Peppler, Kafai, Resnick, & Rusk, 2008; Peppler & Kafai, 2007). However, in studies in which game design has been used to teach subjects such as math and English in formal learning environments, the design aspects of the activity have taken precedence over learning academic content (Ke, 2014; Oldaker, 2010). This highlights that introducing game design into classrooms includes expectations for what students should gain from the experience. With the demand for more research on game design as a learning activity (Ke, 2014; Oldaker, 2010; Robertson & Good, 2005), the present study aims to address this demand by exploring how students’ learning

activities unfold when designing games in the classroom, focusing on the students' use of artifacts in the game design process.

1.2 Learning from designing

A core aspect of this article is to explore how students might learn from participating in a design process: how knowledge is constructed in collaboration when designing computer games and the role of artifacts in this process. Thus, this study relates to the body of work that include theories on learning by design (Kolodner, 2002; Selander, 2008; Selander & Kress, 2010).

In research on learning from game design, inspiration is often drawn from work by Seymour Papert (Papert, 1980; Papert & Harel, 1991), who was an early advocate for how designing for computers could be a powerful way for young people to learn (Papert, 1980). He proposed that knowledge is actively constructed by the learner, and that an effective way to do this is for learners to be involved in a project that they themselves find meaningful, centered on constructing external artifacts (Papert & Harel, 1991)—such as computer games. Research drawing on this perspective emphasized this connection between designing and learning, asserting that “activities involving making, building, programming – in short, designing – provide a rich context for learning” (Kafai & Resnick, 1996, p. 4).

These ideas regarding learning from design have become a main point of departure and theoretical inspiration for much research on learning from designing games. However, Kafai and Resnick's (1996) compilation on learning from design noted that creating computer games was considered an unusual approach to learning, and decades later, learning from designing games is still seen as a less common aspect of game-based learning (Kafai & Burke, 2015).

There are also different approaches to learning from designing games. While a computational thinking approach (Kafai & Burke, 2013, 2015; Wing, 2006) emphasizes drawing on computer science to teach effective problem solving, abstract thinking, and systems design, designing games to build knowledge about a topic emphasizes aspects such as collaborating to use artifacts to find information, make sense of it, and build it into computer games (Selander, 2008b). This article aims to further explore the idea that designing an artifact—here, a computer game—might be powerful for learning, by focusing on how this process unfolds, concentrating on students' participation and use of artifacts in a social and cultural context.

2. Artifacts and stance taking in game design

Designing computer games in the classroom is a social activity that involves the use of talk, body, and objects (Goodwin, 2013). In the present text, we focus on how students use various tools and how the students orient to these tools and each other as knowledgeable in the design process (Du Bois, 2007). To understand this idea, we find two concepts fruitful: artifacts and stance taking.

Artifacts are central parts of almost all social practices and have been described as objects made for (re)production of social and cultural practices. If we look at the classroom, artifacts range from pencils and blackboards to textbooks and computers. Artifacts are developed to do something particular, and they have a particular purpose when placed within institutions. For instance, in schools, a pen is something you write with, books are read and discussed while maps are used to get an overview and navigate in unknown geographic areas. Certain artifacts are expected to be present and are even a precondition in certain social practices like schools, in the sense that without these artifacts, these social practices would be completely different (Latour, 1995). Humans develop and store knowledge in artifacts that take part in, work, and change social practices (Säljö, 2006; Wenger, 1998). Thus, artifacts are objectified knowledge and experiences (Ingold, 2000) that have a meaning potential within a collaborative effort (Linell, 2009). By making information fixed, for example, through creating artifacts like books and computer games, information can be passed on from person to person, and from one generation to another (Säljö, 2006).

Artifacts can be divided into different types, depending on the function the artifacts have within a certain practice (Wartofsky, 1979). Primary artifacts are tools that clearly indicate how they can and should be used, for example, chairs and pencils, and can be seen as an extension of humans' abilities to act. Secondary artifacts cover representations, such as maps and diagrams, that can be perceived and that preserve and transmit acquired skills and modes of action. These artifacts can provide models and explanations that show us how to use primary artifacts, for example, a manual for a mobile phone or an inscription on a machine that tells us how to operate it. Secondary artifacts are often used to store knowledge on how to use primary artifacts. Tertiary artifacts concern imagined or possible worlds that may exist in the form of scientific theories, as well as in virtual worlds in digital games (McDonald, Higgins, & Podmore, 2005). These artifacts are not related to primary artifacts but are used to resonate, discuss, play with, explain,

diagnose, and theorize aspects of our surroundings. It could be argued that designing a history-themed computer game at school means understanding, analyzing, and creating a certain historical period consisting of particular and possible historical events. Moreover, designing such a computer game can be seen as building a third-level artifact. Wartofsky's differentiation of artifacts reminds us that tools are used for many purposes in many practices, that they are material and immaterial in nature, and that they may be complex objects that combine material and semiotic aspects. In the present article, the notion of artifact focuses on how the students choose and use various tools while designing computer games.

Designing computer games in the classroom involves potentially a range of different artifacts, as well as teachers and other students. We use the notion *stance taking* to investigate the social organization of design activities. The concept points to how one is "simultaneously evaluating objects, positioning subjects (self and others), and aligning with other subjects" (Du Bois, 2007, p. 163). A central aspect of stance taking is that this is a public act where the stance is adjusted to other subjects present. For instance, one may agree or disagree with the previous speaker, or a teacher can agree or disagree with the presentation of the historical timeline in a computer game. Thus, stance taking cannot be reduced to a private assumption or attitude.

There are different sorts of stances, but in the present text, we focus on the use of *epistemic stances*. Epistemic stance can be defined as "marking the degree of commitment to what one is saying, or marking attitudes toward knowledge" (Kärkkäinen, 2006, p. 705). Thus, we focus on knowledge claims that interactants assert, contest, and defend in and through the creation of a history-themed computer game. In a social interaction, the persons are assumed to be more or less knowledgeable within particular knowledge domains. Therefore, the participants are positioned relative to each other as more or less knowledgeable, and where their status (identities) are tied to each other rather than separate (Melander, 2012). This relation marks what has been called epistemic status and concerns not only the assumed possession of information but also the participants' right to articulate it (Heritage, 2013). Although epistemic status is considered "a somewhat enduring feature of social relationships vis-à-vis an epistemic domain, epistemic stance by contrast concerns the moment-by-moment expression of these relationships" (Heritage, 2013, p. 377). Epistemic stance taking helps us understand how students negotiate, choose, and handle different artifacts when designing computer games in the classroom.

3. Conducting the study

3.1 Pedagogical design

The research project was conducted with one sixth-grade class and one seventh-grade class in a rural school in the eastern region of Norway. In collaboration with the teachers, it was decided that the sixth-grade students would create games about the Middle Ages and the Viking Age, while the seventh-grade students would create games about the Renaissance and European explorers. These topics fit competency aims from the social studies curriculum for the two grades (Utdanningsdirektoratet, 2013, p. 8), and the game design process would be integrated as a part of the classes' work on these topics.

Before the data collection started, a webpage was created for the sake of the project that included videos and tutorials to teach the students how to design their own computer games using *RPG Maker VX Ace* (Enterbrain, 2011) software. This software was chosen because it requires little programming or game design experience to create games and focuses on storytelling, character development, and game design. However, the software also contains some restrictions, including that the games must be role-playing games. In addition, as the activity was conducted in a social studies class, the teachers and students were expected to operate within the curriculum. This meant that designing computer games was not the main purpose of the exercise (Grover & Pea, 2013). It was a way of learning about social studies topics, as emphasized by the teachers, and a chance for students to use digital media to connect academic learning to their own interests (Deng, Connelly, & Lau, 2016; Ito et al., 2013). In short, the designed computer games were artifacts that were partly developed as the “answer” to the task assigned by the teacher.

3.2 Research design, fieldwork, and data

Data were collected using three video cameras: two stationary cameras and one hand-held camera. The stationary cameras were used to record video of a three-person focus group at all times, with one camera placed in the front of the group to capture the social interaction of the student group, while another camera was used to record the students' computer screen. The hand-held camera was used to capture classroom interactions as they occurred in the rest of the class during the project period. The data collection was accomplished in three phases. First, the

students were observed in an ordinary classroom setting, when the topic they would create games about was introduced. The focus was on group dynamics, social interaction, and dialogue. In the second phase of the data collection, the students were divided by their teacher into dyads and triads, who would design their own computer games for two consecutive days, based on the social studies topics unveiled in the previous phase. The students used the project webpage to learn the game design tool, as well as game design principles. In the third phase two months later, the students, who already knew how to use the software, spent one day designing games in class about a different topic in their social studies curriculum. Toward the end of each game design period, the students participated in a playtest in which they played and commented on each other's games.

The data consisted of video data, as well as the students' finished computer games and observation notes (table 1). The video data were first organized in a content log that included short narrative summaries of events that occurred (Derry et al., 2010), as well as rough transcriptions of dialogue and categories that emerged as being significant—in this case, how the students' use of artifacts emerged as a category. As recurring patterns of how students used artifacts were observed in the data, events were selected that demonstrated different aspects of students' artifact use. From these events, selected events were transcribed in detail using a modified version of Jeffersonian transcription notations (see the Appendix). Images are included to provide information about non-verbal interactions that are relevant to the analyses, drawn from screenshots of the video data. Data were analyzed using analytical concepts from conversation analysis (C. Goodwin & Heritage, 1990), focusing on the social organization of the activities.

In the analysis, excerpts from different stages in the game design process are presented: when the students create the game story and game world and when the students design game characters. These excerpts were selected because they illustrated a recurring pattern in the data regarding how the students used various artifacts to accomplish game design tasks.

Type of data	Data produced
Video data from three video cameras	Video data from the three-member target groups, front/interactions: 30 hours Screen data from target group: 30 hours Hand-held camera: 15 hours In total: 75 hours
Written data	Observation notes
Finished computer games	Seventh grade, “European explorers”: 4 games* Seventh grade, “The Renaissance”: 4 games Sixth grade, “The Middle Ages”: 4 games Sixth grade, “The Viking Age: 4 games *One game for each group In total: 16 computer games

Table 1: Overview of the data

4. Designing games in the classroom about history

Designing computer games in the classroom is a social activity that involves several artifacts. Introducing new technologies changes the classroom dynamics, adding to traditional practices established over centuries with artifacts such as pencils, textbooks, and blackboards (Arnseth, 2011). Within the classroom’s epistemic ecology, students are expected to learn or know how to handle relevant artifacts when solving school tasks.

In the present study, we focus on how maps, books, and images become central when designing a computer game. We examine how students collaborated and used different artifacts to create computer games, as well as show how they engage with different artifacts in this endeavor. The following episodes demonstrate several aspects of how artifacts are used and function in the students’ game design process.

4.1 Creating the game story: the Crusader’s journey

The following excerpt shows how a physical world map hanging on the wall becomes an important artifact for students when creating a virtual representation in the game world.

Seventh-grade students Peter, Casper, and Samuel are designing a computer game on the topic the Middle Ages. The boys decide to make a game about the Crusades. They have just

watched the first game design instruction video and are prompted by the software to name their game map, which is the term used to describe an area in which the player can move, such as a city, ocean, or house. Casper controls the keyboard, while Peter and Samuel sit on each side of him. A large, raised relief map of Europe hangs on the wall next to the three students. When the excerpt starts, the students are discussing where the Crusaders came from, as this also marks the start of the journey and the name of the game map.

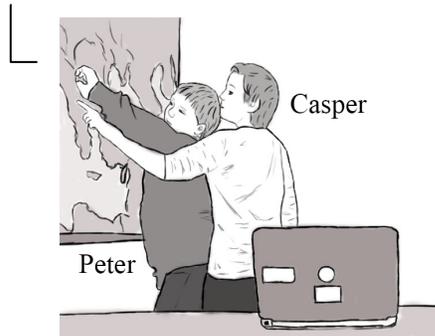
Excerpt 1. Participants: Peter, Casper, and Samuel.

- 1 Peter ((turns towards Casper)) Should he be Norwegian or should he come from Rome?
 2 Casper (0.2) ((looks at Casper)) Yes he could come from sort of not that far away ((turns and looks at the map)) No! But the Crusaders they came from Norway
 3 Peter Or from Rome↑

Peter turns toward the teacher who is helping another group and asks her whether the Crusaders came from Rome. He walks over to her, and they talk while Casper and Samuel look at her. Peter returns, tells them that she “didn’t say anything,” and the students continue their discussion.

- 17 Peter But we could take ((climbs the chair)) look here ((points at the map)) if we find Rome (.) don’t really know where it is(h) (.) Rome (.) there is Rome ((pointing and touching the map))
 18 Casper Is that Rome?
 19 Peter Yes there is Rome ((climbs down from the chair, still pointing at the map)) yes Rome lies there ((pointing)) then he goes [around here (.) up here (.) down there (.) over there ((tracing the movement with his finger pressed on the map))
 20 Samuel & Casper [((Turns away from Peter and looks in another direction))
 21 Peter And over to ((laughing)) I don’t know where that is (.) I don’t know where Jerusa (.) Jerusalem is
 22 Casper ((Turns toward Peter again, gets up, and looks at the map)) Jerusalem?
 23 Peter Yes
 24 Casper Are you stupid or what? Jerusalem is down here ((pointing)) move over (.) I will find Jerusalem for you
 25 Peter ((Points)) It is (.) here
 26 Casper °Here’s Jerusalem°
 27 Peter ((Points with Casper down at the map, then a bit further up on the map)) Yes (1.0) then he goes from (.) [here
 28 Casper [He has to go here (.) you know ((pointing around the same place as Peter))

29 Peter ((Traces the map with Casper while talking)) Then he goes here (.) up here (.) and down here (.) and there (.) and then he goes [between



30 Casper [Then it was Yugoslavia (.) wasn't it?

31 Peter ((Points at the map while talking)) And then he goes over here (.) and he drives over *the Black Sea* down here

32 Casper ((Holds his hand on top of Peter's while pointing)) But we must say that he must cross a river (.) and here's a river

33 Peter He must cross a river?

34 Casper Yes (.) and there are crocodiles in it

35 Peter Yes

36 Casper Then he will take a sword and kill them ((goes away from the map, looks at Samuel, and nods while Peter keeps pointing at the map))

The sequence starts with Peter initiating a question: Is the protagonist Norwegian, or is he from Rome (line 1)? Casper claims that the Crusaders came from Norway. Peter disagrees with this stance by adding “or Rome” (lines 2–3). Peter orients to the teacher as having epistemic primacy to get an answer to their question. When their attempt to get an answer from the teacher fails, they turn to the map on the wall to decide where the game’s protagonists should come from.

Peter climbs on the chair and gazes at the map on the wall while searching for and finding Rome: “don’t really know where it is(h) (.) Rome (.) there is Rome” (line 17). Peter even climbs on top of the chair to make it easier to interact with the map, positioning his body in a way that makes it easier to experience and understand the important features of the joint activity of constructing the game story and finding relevant places on the map (C. Goodwin, 2007). As he investigates the map, he moves from not knowing to knowing where Rome is located. With reference to the map, he claims the right to know the location of the city. Casper does not seem familiar with the location of Rome on the map, but Peter assures Casper that it is correct (lines 18–19). Still keeping his finger on the map, Peter gets down from the chair and starts tracing a path from Rome to the east. Using his finger, Peter begins shaping the game story about the

player character's journey as a Crusader. Once again, Peter encounters the challenge of not knowing the geography of the Crusaders' journey. At the same time that he laughingly states he does not know exactly where to find Jerusalem (line 21), he shows that he knows the name of the city where the Crusaders went. According to Casper, where Jerusalem is located is something Peter obviously should know: "Are you stupid or what? Jerusalem is down here ((*pointing*)). Move over (.) I will find Jerusalem for you" (line 24). Taking an epistemic stance, Casper says he knows this and that he intends to demonstrate it. Peter and Casper use the map as a secondary artifact and then a resource when they claim epistemic primacy with regard to where Rome and Jerusalem are located. The locations matter because they mark the beginning and the end of the journey in the game.

Then, Peter points at Jerusalem on the map, which is confirmed by Casper (lines 25–26). The boys then point at the map and jointly trace the main character's journey (lines 29–31) as they comment on places they pass on the map: "Then it was Yugoslavia (.) wasn't it?" (line 30), or places that have consequences regarding how they will design the game: "And then he goes over here, and he drives over the Black Sea down here" (line 31). Here, how a new element is introduced in the Crusader's journey can be seen: Casper says the protagonist must cross a river where there are crocodiles, which Peter aligns with (lines 32–35)—and then "he will take a sword and kill them" (line 36), as Casper states. Casper moves away from the map, looks at Samuel, and nods. While Samuel observes during most of the sequence, Casper meets Samuel's gaze and nods after stating that the protagonist will kill the crocodiles (line 36), inviting him to align with the other students' constructed story world (Sidnell, 2011). Through looking at and touching the map, they trace the game character's journey with their hands, inspecting the names of the countries, cities, and seas. The embodied experience of investigating and touching the possible route makes them talk about how to travel across the landscape (land and bodies of water). Through this inspection, the students identify places that may hold importance for the game story: The Crusader must cross a river, pointed out on the map by Casper (line 32), and this river has crocodiles that the Crusader will have to fight and kill to cross.

In sum, the role of the map suddenly changes from a secondary artifact to a tertiary artifact, and is now a resource and a virtual frame in the creation of the game story. The map hanging on the wall in the classroom becomes an important artifact used in different ways. It works as a joint focus of attention (which is central in planning the game), it works as a resource

to make a somehow authentic game map with a beginning and an end, and it works as a visualization of the planned game world and where the students want to place upcoming game tasks during the protagonist's travels from Rome to Jerusalem.

4.2 Building the game world: churches in Florence

When designing a computer game related to the social studies curriculum, the students often consulted books and webpages to make their games historically accurate. In Excerpt 2, the students are engaged in a discussion of what kinds of buildings there should be in a Renaissance city—in this case, Florence. They identify two churches named Santa Maria. The question is: Which church should be the model for the one they are going to use in the game? To solve this problem, the students used their textbook and an online search engine.

When we enter the excerpt, the three seventh-graders are facing the screen. Samantha is in the middle with June and Marcus at her sides. The software they use for the game creation, *RPG Maker VX Ace*, is on the screen. June has a social studies textbook open in front of her.

Excerpt 2. Participants: Marcus, Samantha, and June:

- 1 Samantha >and we can make that church< ((*points at a picture in the book, then turns toward Marcus*))
- 2 Marcus And white houses
- 3 Samantha But I think we should have a little bit larger area (.) ((*opening a browser and navigating to Google*)) we'll search for ((*writing "florence renaissance" in the search field and opens the results for image search*)) Florence (xxx) let's see
- 4 June ((*Turning pages in the textbook while Marcus and Samantha study the screen*))
 (.) ((*moving closer to the others and looking at the screen with them*))
- 5 Marcus We can try to make that church ((*pointing with his finger at the screen*))

6 Samantha Yeah but you see there are two churches you see with that name (.) it is that (red one) ((*pointing*)) and the other one is (the one that has the) ((*pointing*)) if it is not the same though (.) °don't know° (.) I could have been there!



7 Marcus But that isn't Florence is it?

8 Samantha ((*Turning toward Marcus, smiling*)) I have been there twice (.) I have been inside there once but I have been (.) (three two there)

9 Marcus That looks like ((*June and Samantha lean in closer to the screen, study it for four seconds*))

10 Samantha M::hm (.) it might be that it was there but that they tore it down (.) then it is

11 Marcus What is the name of the church that is there? ((*looking at the screen*))

12 Samantha ((*Looks down into the textbook*)) Santa Maria (.) something and the other one is also called Santa Maria (.) something else (.) but it is something more (.) a difference (.) on both of them

When searching for images, the students encounter a picture they find amusing, giggle a bit, and then continue searching for the church.

17 Marcus But we can try to make that church ((*leaning across the table and pointing at a picture in the book*)) or that church



18 June ((*Turning pages in the textbook*))

19 Samantha ((*Turning pages in the textbook*)) (xxx) and there is that one ((*pointing at an image, turning pages back to an earlier page*)) I think there are two different churches

- 20 Marcus Yes (.) but (.) I would rather make that one (.) ((*starts writing in the search box*)) what was the name
- 21 Samantha Santa [Maria
- 22 Marcus [<Santa Maria>
- 23 Samantha But there can be more churches with that name though (.) so you have to take (.) Florence (.) yes there both are showing (3.0) but look ((*pointing at the screen*)) that church is sort of in the middle of many houses
- 24 Marcus In the middle of the town in a way
- 25 Samantha Yes
- 26 Marcus We should have made that one ((*pointing*)) then
- 27 Samantha Yes

When the students discuss what the town should look like, Samantha suggests that they make a church that looks like the one in the book (line 1). Marcus, who wants to add white houses, continues with this idea. The textbook functions as a starting point for the students' discussion. The picture in the book does not seem to fulfill what Samantha has in mind, and she switches artifacts, now using Google to search for pictures of Florence and the Renaissance (line 3). This search results in many pictures that appear on the screen, which stands in contrast to the book that has few pictures of Renaissance architecture in Florence. June, who has been looking in the textbook, now switches her focus to the screen, which now works as a joint focus of attention toward which all three students are pointing and gazing, while they orient their bodies toward each other or lean forward (lines 1–27).

Marcus then suggests that they use one of the pictures of churches that appeared in the image search on Google as a model for one in the game. Samantha makes it clear that this is not that easy and tells him that there are two churches with a similar name, but that they do not look the same (line 6). She says she is not sure about which church is the right one, thus signaling that the game world must correspond to how it may have looked like during the Renaissance. Therefore, books, as well as Google, are used as epistemic resources in the reproduction of historical facts. A discussion of how the world looked runs throughout this excerpt, and in this discussion, the students switch between different artifacts, the textbook and Google. We can see how Marcus is not sure that the images they found on Google are from Florence, doubting the epistemic authority (Heritage & Raymond, 2005) of the source (line 7). Samantha smiles as she tells them that she has been to Florence twice, thus positioning herself as someone who has the right to claim that she knows what it looks like and therefore, is able to identify the correct

church. However, she does not seem to recognize any of the churches and suggests that it might be possible that the church has been torn down (line 6–10). During this sequence, they are all studying the pictures on the screen. Marcus gazes at the book and asks the name of one of the churches in the picture. Samantha, who is seated right in front of the textbook, finds that they are both called “Santa Maria (.) something” (lines 10 and 12). After continuing the image search, Marcus points at one of the churches and suggests that they “could try make that church or that church” as part of the environment in the game (line 17). To Marcus, selecting which church to use as a model when designing the game is not important. Samantha looks at the textbook once more, points at an image, and tells him, “I think there are two different churches” (line 19). Using the notion “think,” she indicates that she is not sure. Marcus aligns with Samantha but tells her that he would rather create the church that he previously showed her. Then he starts to search for images of this church (line 20). Samantha points out that there might be more churches with that name, and that he should, therefore, add “Florence” to his search keywords (line 23). They find that both churches show up, but one of the churches is located in “the middle of many houses,” or a town. They decide to choose this church as a model for the game (lines 25 to 27), and later, they implement the church in their game (Figure 1).



Figure 1: The Santa Maria Church in the students’ game world. The church added to the game world is seen in the lower-right corner of the screenshot in line 6.

Professional game creators often spend time researching the setting in which the game takes place, such as Renaissance Italy, utilizing resources such as books and online resources (Heussner, Finley, Hepler, & Lemay, 2015). Similarly, in this excerpt, the students shift between

using the textbook and a Google Images search. Their textbook is the students' point of departure, and the information they find on Google is compared with what they find in the textbook. The search engine Google becomes an artifact that shows pictures of churches that they want to include in their game. The pictures play an important role when it comes to modeling the virtual landscape that they are about to create. The textbook is used to find a picture of a particular church, which is important to the students. Knowledge is graded and influenced by the social norms of the setting in which the knowledge occurs (Stivers, Mondada, & Steensig, 2011). Here, the textbook is considered to have epistemic primacy and thus, is also more trustworthy in the students' work in creating a historic authentic game environment.

4.3 Creating game characters: designing Magellan

When designing characters for the game, the students usually started by designing the character controlled by the player, often using their textbook as a reference to ensure that the game characters look accurate. The following excerpt shows how three seventh-grade students create their player character, the explorer Magellan, and how artifacts are used to make him look as similar as possible to a picture in the textbook. The students use a character-creation editor that is part of the game design software (Figure 2), in which they can choose among options such as gender, hair and eye color, facial shape, and other features.

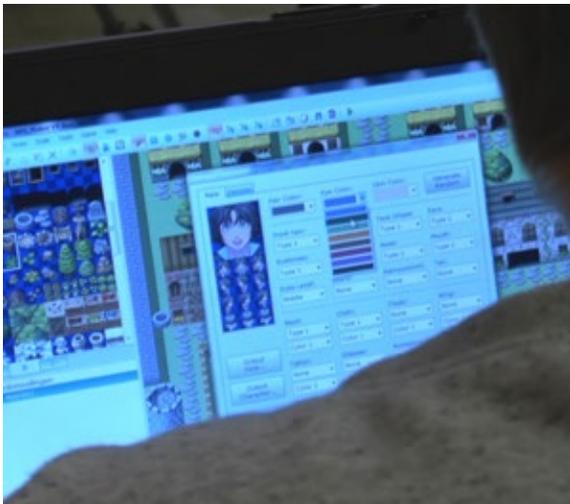


Figure 2: Marcus uses the character generator to create Magellan.

Samantha is sitting in the middle with the computer in front of her, with Marcus and June on each side. An open textbook sits beside June. When this excerpt starts, the students have just finished watching a video tutorial about creating game characters. Marcus is in control of the mouse and keyboard.

Excerpt 3. Participants: June, Samantha and Marcus.

- | | | |
|----|----------|--|
| 1 | Marcus | OK it was <u>there</u> (2.0) and <u>there</u> (1.0) this is a <u>boy</u> ((<i>looking at the screen where the character generator is open</i>)) |
| 2 | Samantha | Eh wait a bit (.) can I ((<i>bends down toward the book that June has in front of her and sets it upright, looks at a picture in the book with June and Marcus</i>)) (we can look in the book a bit now) |
| 3 | Marcus | ((<i>Looks back on the screen</i>)) At least he has a black <u>↑beard</u> then |
| 4 | June | ((<i>Bends down toward the book</i>)) Yes |
| 5 | Marcus | But what is his eye color (.) do you see that? |
| 6 | Samantha | ((<i>Looks in the book with June and Marcus, puts the book down and looks back on the screen</i>)) We'll take brown |
| 7 | Marcus | Brown? |
| 8 | Samantha | Blue looks a bit |
| 9 | Marcus | A::h >is that brown?< |
| 10 | June | Ye:ah= |
| 11 | Marcus | =Okay (.) what skin color? ((<i>gazes toward the book, then back to the screen</i>)) |
| 12 | Samantha | ((<i>Looks down into the book with June, then on the screen</i>)) Not (.) so very <u>pale</u> |
| 13 | Marcus | That one? °is° (.) he is not that one (.) he is not that one (.) |
| 14 | Samantha | He is the (.) first |
| 15 | June | Yes |
| 16 | Marcus | Key th:en (2.0) e:hm |

The students continue creating the game character, deciding on his hair, facial shape, and what his mouth should look like.

- | | | |
|----|----------|---|
| 82 | Marcus | OK he didn't have any of that (.) <u>tail</u> (.)↑he had a tail↑ ((<i>talks with raised pitch</i>)) |
| 83 | Samantha | No he didn't (.) ((<i>frowns</i>)) <u>wings</u> ↑ |

Marcus has opened the character generator and takes an epistemic stance where he displays that he knows where to look and what to do when creating a male character (line 1). They are prompted to choose the gender of the character before choosing facial features, clothing, and other aspects of the character's appearance. Samantha tells Marcus to slow down.

She directs her attention to the textbook and sets it upright so that she, June, and Marcus can study the picture and says that they should look in the book (line 2). To conduct relevant actions, it is necessary that all participants position themselves so that they can clearly perceive each other and the structures in the environment that have importance for the activity in question (C. Goodwin, 2007, p. 61). The textbook and the portrait of Magellan become a joint focus of attention and a starting point for the activity to determine what their main character should look like. When putting together the main character, they compare it with the image in the book (lines 3–15). Marcus states that the character should at least have a black beard, which June agrees to after looking at the image of Magellan in the book (line 4). Marcus then asks about eye color, to which Samantha, June, and Marcus all look in the book and agree the eyes should be brown (lines 5–10). Marcus then asks about skin color, to which Samantha responds “Not (.) so very pale” while studying the image in the book (lines 11–12). Marcus then goes through different options, asking if it is “this one” and then stating “not that one” and “not that one.” Samantha suggests that it is the first one, June agrees, and Marcus finally chooses it (lines 13–16). This sequence shows how the students ascribe epistemic authority to the textbook, a classroom artifact associated with what students are supposed to know (Selander, 2008, p. 13), using the picture in the book as a model of how Magellan should look in their game. Designing the main character is a joint accomplishment. Marcus is in control of the mouse and keyboard, physically creating the character on the screen, but before he makes the choices, he seeks confirmations and alignments from June and Samantha, who have better access to the textbook. While the keyboard and mouse are undisputed and taken for granted while creating the game, the picture in the textbook becomes an object of negotiation that stimulates, as well as restricts, how they act: not in terms of how to use it but in terms of how to read and translate it to the screen.

After creating the eyebrows and finding a beard for their character, they move on to the next category in the character generator. This category includes features often related to high fantasy, such as elven ears and tails. Marcus states that Magellan “didn’t have any of that,” but when he finds that it is possible to add a tail, he says “↑ he had a tail ↑ ” with a high-pitched voice (line 82), indicating a shift to a frame (M. H. Goodwin, 1996) in which the activity is perceived as more playful. Samantha, however, states that Magellan did not have a tail, frowns, and says “wings” with a disapproving voice, clearly disaligning with Marcus.

Although the computer is the primary artifact that the students are using to create their games, secondary artifacts provide guidance for how the primary artifacts should be used, functioning as models for how to think and act (Säljö, 2006). The game design software provides possibilities and limitations on what the students can design, while the textbook is used as a historical reference point for what the game character should look like to be “correct.” The characters the students create spring from a process of analysis and discussion of the pictures in the textbook, deciding on what the character historically should look like and discovering what the game design software allows them to do.

Creating well-thought-out game characters is often emphasized by game designers. Not only will the player experience the game world through this character, but the design also may convey meaning about the character, such as his or her backstory (Heussner et al., 2015). In this context, the difference is that this must be informed by what the historical person behind the character they are making was like. Although the software used by the students allowed them to create characters with wings and a tail, the students’ source for how the game should be made is their textbook, an artifact that stores knowledge about what Magellan looked like, which they, in turn, embed in their character.

5. Summary and discussion

5.1 Summary of findings

This article explores what artifacts students use when designing computer games in the classroom, as well as how the students use the artifacts, focusing on how artifacts are given different epistemic status and their contribution to the students’ computer game construction. From the analyses, the following main findings should be highlighted.

First, artifacts that are common to a classroom were central to the students’ game design activities in all phases of the process. Theories on learning from design suggest that creating an external artifact can be a powerful way to learn, and the findings suggest that the students’ collaborative use of established artifacts were central to this process. When creating one game story, a map was used to geographically locate the places the game’s protagonist would visit on his journey from Rome to Jerusalem (excerpt 1). When designing another game world, students combined a textbook and Google Image searches to decide what Renaissance Florence should

look like (excerpt 2). And when the students created the main character for another game, Magellan, an image in the textbook was used to make the game character look as much like Magellan as possible (excerpt 3).

Second, the artifacts used appear to differ regarding epistemic authority (Heritage & Raymond, 2005). Although it has been speculated that digital artifacts introduced into classrooms might challenge the relevance of textbooks (Skantz Åberg, Lantz-Andersson, & Pramling, 2014; Åkerfeldt, 2014), the episodes presented and the data corpus of this project show that the textbook is used as a starting point for the activity and to verify knowledge claims made by other students. The students in this research project often emphasized making their computer games historically accurate, which is likely because the project was a school activity conducted in a classroom environment. The textbook is an example of an artifact that is used in the subject during regular instruction and represents what students are expected to know (Selander, 2008, p. 13).

Third, the interplay between artifacts on different levels is central to the students' construction of knowledge, and the function of the artifact might quickly change during the students' activities. For example, although the function of a map of Europe is to transmit geographic knowledge (a secondary artifact in Wartofsky's terms), the students used the map as a focus of attention to jointly create a game story, which made the map more like a tertiary artifact, in which imagined worlds and play are central (McDonald et al., 2005; Wartofsky, 1979).

5.2 Artifacts in game design in the classroom

The aim of this article is to show how artifacts are used when students design games in a classroom setting. We have argued that building a history-themed computer game in the classroom might mean analyzing, discussing, and understanding a historical topic. The analyses show the complexity of this process, with artifacts as a core component.

These analyses showed that the students' construction of knowledge consisted of an interplay between the classroom setting, including established artifacts and social norms, and the nature of the activity of creating narrative-driven computer games. As seen in the literature review, learning from game design is often focused on learning programming or computer skills. In these studies, computational thinking or related aspects are often central, with computational

thinking referring to “aspects of designing systems, solving problems, and understanding human behaviors” (Wing, 2006, p. 6). In many ways, the students’ participation in the game design activity is related to solving problems that arise during the process: Where did the Crusaders come from? Which Santa Maria church should we portray in the game? What did Magellan look like? However, when designing games about topics such as history, there are no clear-cut answers. Instead, the students’ learning processes are characterized by negotiating what should be central in the games they are making, by making knowledge claims and taking epistemic stances in relation to what the students see as important for the game they are creating. In this process, textbooks and online resources were utilized and compared to find information about historical topics, wall maps functioned as a blueprint for the students’ own game maps, and through the students’ discussions, negotiations, and redesign, the knowledge they constructed together was built into their computer game. The findings from these analyses, thus, support researchers who argue for the need for more research on game design about topics such as social studies (Ke, 2014; Oldaker, 2010; Robertson & Good, 2005), as the nature of history-themed computer games and the classroom facilitate a different context for learning by design than research on games programming or research conducted in out-of-school settings.

Game designers engage with knowledge areas such as art, problem solving, and storytelling (Salen, 2007). The designers need to balance historical accuracy with fun gameplay (Schrier, 2014), research game settings (Heussner et al., 2015), and integrate content with game mechanics (Kafai & Burke, 2016). The students in the present project proceeded similarly, using an artifact (game design software) that has been used to create critically acclaimed games for entertainment (Freebird Games, 2011; Vagabond Dog, 2014). However, as the activity took place in classrooms, the stories the students created, the worlds they built, and the characters they made were influenced by the classroom ecology, which included existing artifacts and social norms and values concerning what classroom learning should be about.

It was at this nexus where students’ knowledge building took place. While creating the stories, game worlds, and characters, the students jointly established where different cities were located on a map, what Florence in the Renaissance looked like, and what the explorer Magellan looked like—at least according to the textbook. In the interplay between the new software and the established artifacts, the students created a new artifact (a game, i.e., a tertiary artifact) that

they designed by drawing upon what was available in the classroom environment and from their understanding of games, building their knowledge of historical facts into the games.

Thus, introducing software used by game designers into a classroom context allows students to draw on the playful, narrative-focused aspects of games and build knowledge associated with classroom learning into games. In both cases, however, it is clear that when game design enters a classroom, it does not render already established artifacts obsolete. On the contrary, these artifacts are a vital part of the game design process and should be available and taken into consideration when introducing game design as a learning activity. Moreover, game design in classrooms is not done only on a computer. The activity happens through the interplay between the newly introduced software and the established artifacts available.

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7. Appendix: Transcript notations

Adapted from Jefferson (2004)

(.)	Full stop inside brackets: Micropause of no significant length
(0.2)	Number inside brackets: Timed pause
[]	Square brackets: Overlapping speech
((<i>smile</i>))	Italics inside brackets: Description of non-verbal activity
(xxx)	Bracketed xxx: Talk that was too unclear to transcribe
(word)	Text within brackets: Unclear talk/doubtful transcription
?	Question mark: Inquiring intonation
↑	Upward arrow: Rise in intonation
↓	Downward arrow: Drop in intonation
> <	Talking with increased speed
:::	Colons: Elongated speech
(h)	Bracketed h: Laugh within the talk

<u>talk</u>	Underlined: Emphasized talk
=	Equal sign: Continuation of talk
°word°	Degree sign: Quiet speech
<i>word</i>	Italics, no brackets: Words uttered in English in original

8. References

- 11 bit studios. (2014). *This War of Mine* [Computer game]. Warsaw: 11 bit studios.
- 3rd World Farmer Team. (2005). *3rd World Farmer* [Flash game]. Retrieved from <https://3rdworldfarmer.org/>
- Arnseth, H. C. (2011). Enacting Complex Relations. *Nordic Journal of Digital Literacy*, 6, 357–368.
- Birmingham, S., Charlier, N., Dagnino, F., Duggan, J., Earp, J., Kiili, K., ... Whitton, N. (2013). Approaches to collaborative game-making for fostering 21st century skills. In C. Vaz de Carvalho & P. Escudeiro (Eds.), *Proceedings of the 7th European Conference on Games-Based Learning* (Vol. 1, pp. 45–52). Reading, UK: Academic Publishing International.
- Darvasi, P. (2016). *Empathy, Perspective and Complicity: How Digital Games can Support Peace Education and Conflict Resolution*. Working Paper 03, Mahatma Gandhi Institute of Education for Peace and Sustainable Development & United Nations Educational, Scientific and Cultural Organization.
- Deng, L., Connelly, J., & Lau, M. (2016). Interest-driven digital practices of secondary students: Cases of connected learning. *Learning, Culture and Social Interaction*, 9, 45–54. <http://doi.org/10.1016/j.lcsi.2016.01.004>
- Denner, J., Werner, L., & Ortiz, E. (2012). Computer games created by middle school girls: Can they be used to measure understanding of computer science concepts? *Computers and Education*, 58(1), 240–249. <https://doi.org/10.1016/j.compedu.2011.08.006>
- Derry, S. J., Pea, R. D., Barron, B., Engle, R. A., Erickson, F., Goldman, R., ... Sherin, B. L. (2010). Conducting Video Research in the Learning Sciences: Guidance on Selection, Analysis, Technology, and Ethics. *Journal of the Learning Sciences*, 19(1), 3–53. <http://doi.org/10.1080/10508400903452884>
- Du Bois, J. W. (2007). The Stance Triangle. In R. Englebretson (Ed.), *Stancetaking in Discourse: Subjectivity, Evaluation, Interaction* (pp. 139–182). Amsterdam, Netherlands: John Benjamins Publishing Company.
- Enterbrain. (2011). *RPG Maker* [Computer software]. Retrieved from <http://www.rpgmakerweb.com/>
- Freebird games. (2011). *To the moon* [Computer game]. Canada: Freebird games.
- Gee, J. P. (2007). *What Video Games Have To Teach Us About Learning and Literacy* (2nd ed.). New York: Palgrave MacMillan.

- Global Kids, & GameLab. (2006). *Ayiti: The Cost of Life* [Flash game]. New York, N.Y: Global Kids & Gamelab. Retrieved from <https://ayiti.globalkids.org/game/>
- Goodwin, C. (2007). Participation, stance and affect in the organization of activities. *Discourse & Society*, 18(1), 53–73.
- Goodwin, C. (2013). The co-operative, transformative organization of human action and knowledge. *Journal of Pragmatics*, 46(1), 8-23.
- Goodwin, C., & Heritage, J. (1990). Conversation Analysis. *Annual Review of Anthropology*, 19, 283–307.
- Goodwin, M. H. (1996). Shifting frame. In D. I. Slobin, J. Gerhard, A. Kyratzis, & J. Guo (Eds.), *Social Interaction, Social Context, and Language: Essays in Honor of Susan Ervin-Tripp* (pp. 71–82). Mahwah, NJ: Lawrence Erlbaum.
- Grover, S., & Pea, R. (2013). Computational thinking in K–12: A review of the state of the field. *Educational Researcher*, 42(1), 38–43.
- Hayes, E. R., & Games, I. A. (2008). Making computer games and design thinking: A review of current software and strategies. *Games and Culture*, 3(3–4), 309–332.
<http://doi.org/10.1177/1555412008317312>
- Heritage, J., & Raymond, G. (2005). The Terms of Agreement: Indexing Epistemic Authority and Subordination in Talk-in-Interaction. *Social Psychology Quarterly*, 68(1), 15–38.
<http://doi.org/10.1177/019027250506800103>
- Heritage J. (2013). Epistemics in Conversation. In: J. Sidnell and T. Stivers (Eds.) *The Handbook of Conversation Analysis*. Chichester, UK: John Wiley & Sons, Ltd., 370-395
- Heussner, T., Finley, T. K., Hepler, J. B., & Lemay, A. (2015). *The Game Narrative Toolbox* (Kindle edi). New York and London: Focal Press, Taylor & Francis group.
- ImpactGames. (2007). *PeaceMaker* [Computer game]. Pittsburgh, PA: ImpactGames.
- Ingold, T. (2000). *The Perception of the Environment: Essays on livelihood, dwelling and skill*. London and New York: Routledge.
- Ito, M., Gutiérrez, K., Livingstone, S., Penuel, B., Rhodes, J., Salen, K., ... Watkins, S. C. (2013). *Connected Learning: An Agenda for Research and Design*. Irvine, CA.
- Jefferson, G. (2004). Glossary of transcript symbols with an introduction. In G. H. Lerner (Ed.), *Conversation Analysis: Studies from the first generation* (pp. 13–31). Amsterdam: John Benjamins Publishing.

- Kafai, Y. B. (2006). Playing and Making Games for Learning: Instructionist and Constructionist Perspectives for Game Studies. *Games and Culture*, 1(1), 36–40.
<http://doi.org/10.1177/1555412005281767>
- Kafai, Y. B., & Burke, Q. (2013). Computer programming goes back to school. *Phi Delta Kappan*, 95(1), 61–65. <https://doi.org/10.1177/003172171309500111>
- Kafai, Y. B., & Burke, Q. (2015). Constructionist Gaming: Understanding the Benefits of Making Games for Learning. *Educational Psychologist*, 50(4), 313–334.
<http://doi.org/10.1080/00461520.2015.1124022>
- Kafai, Y. B., & Burke, Q. (2016). *Connected Gaming: What Making Video Games Can Teach Us About Learning and Literacy* (Kindle edi). Cambridge, MA: The MIT Press.
- Kafai, Y. B., & Resnick, M. (1996). Introduction. In Y. B. Kafai & M. Resnick (Eds.), *Constructionism in Practice: Designing, Thinking, and Learning in a Digital World* (pp. 1–8). New York: Routledge.
- Ke, F. (2014). An implementation of design-based learning through creating educational computer games: A case study on mathematics learning during design and computing. *Computers & Education*, 73, 26–39. <http://doi.org/10.1016/j.compedu.2013.12.010>
- Kärkkäinen, E. (2006). Stance taking in conversation: From subjectivity to intersubjectivity. *Text & Talk*, 26(6), 699–731.
- Latour, B. (1995). Mixing humans and nonhumans together: the sociology of a door-closer. In S. L. Star (Ed.), *Ecologies of knowledge: Work and politics in Science and technology* (pp. 257–277). New York: State University of New York.
- Linell, P. (2009). *Rethinking language, mind, and world dialogically: Interactional and contextual theories of human sense-making* (Advances in cultural psychology: constructing human development). Charlotte, N.C: Information Age Publ.
- Maloney, J., Pepler, K., Kafai, Y. B., Resnick, M., & Rusk, N. (2008). Programming by Choice: Urban Youth Learning Programming with Scratch. In *SIGCSE '08* (pp. 367–371). ACM Press.
<https://doi.org/10.1145/1352135.1352>
- Melander H. (2012). Transformations of knowledge within a peer group. Knowing and learning in interaction. *Learning, Culture and Social Interaction* 1: 232-248
- McDonald, G., Le, H., Higgins, J., & Podmore, V. (2005). Artifacts, Tools, and Classrooms. *Mind, Culture, and Activity*, 12(2), 113–127. http://doi.org/10.1207/s15327884mca1202_3
- McLuhan, M. (1964). *Understanding media : The extensions of man*. London: Routledge & Kegan Paul.

- Microsoft Research. (2017). *Kodu* [Computer software]. Retrieved from <https://www.kodugamelab.com/>
- MIT Media Lab. (2017). *Scratch* [Computer program]. MIT Media Lab. Retrieved from <https://scratch.mit.edu/>
- Oldaker, A. (2010). Creating Video Games in a Middle School Language Arts Classroom: A Narrative Account. *Voices from the Middle*, 17(3), 19–26.
- Papert, S. (1980). *Mindstorms: Children, computers, and powerful ideas*. New York: Basic Books, Inc.
- Papert, S., & Harel, I. (1991). Situating Constructionism. In S. Papert & I. Harel (Eds.), *Constructionism* (pp. 1–13). Norwood, NJ: Ablex.
- Peppler, K. A., & Kafai, Y. B. (2007). From SuperGoo to Scratch: exploring creative digital media production in informal learning. *Learning, Media and Technology*, 32(2), 149–166. <http://doi.org/10.1080/17439880701343337>
- Prensky, M. (2001). *Digital game-based learning*. New York: McGraw-Hill.
- Red Redemption. (2011). *Fate of the World: Tipping Point* [Computer game]. Oxford, UK: Red Redemption.
- Robertson, J., & Good, J. (2005). Story creation in virtual game worlds. *Communications of the ACM*, 48(1), 61–65.
- Salen, K. (2007). Gaming literacies: A game design study in action. *Journal of Educational Multimedia and Hypermedia*, 16(3), 301–322.
- Schrier, K. (2014). Using Digital Games to Teach History and Historical Thinking. In K. Schrier (Ed.), *Learning, Education and Games* (pp. 73–91). Pittsburgh, PA: ETC Press.
- Selander, S. (2008). Designs for Learning –A Theoretical Perspective. *Designs for Learning*, 1(1), 10–22. <http://doi.org/10.1080/14626260802312673>
- Selander, S., & Kress, G. (2010). *Design för lärande: ett multimodalt perspektiv [Designs for Learning: A multimodal perspective]*. Stockholm: Norstedts
- Sidnell, J. (2011). The epistemics of make-believe. In T. Stivers, L. Mondada, & J. Steensig (Eds.), *The morality of knowledge in conversation* (Kindle edi, pp. 131–158). Cambridge: Cambridge : Cambridge University Press.
- Simons, J. (2007). Narrative, games, and theory. *Game Studies. The International Journal of Computer Game Research*, 7(1). Retrieved from <http://www.gamestudies.org/0701/articles/simons>

- Skantz Åberg, E., Lantz-Andersson, A., & Pramling, N. (2014). "Once upon a time there was a mouse": children's technology-mediated storytelling in preschool class. *Early Child Development and Care*, 184(11), 1583–1598. <http://doi.org/10.1080/03004430.2013.867342>
- Squire, K., & Barab, S. (2004). Replaying history: Engaging urban underserved students in learning world history through computer simulation games. In *Proceedings of the 6th international conference on learning sciences* (pp. 505–512). Santa Monica, CA: International Society of the Learning Sciences.
- Stivers, T., Mondada, L., & Steensig, J. (2011). Knowledge, morality and affiliation in social interaction. In *The morality of knowledge in conversation* (Kindle edi, pp. 3–24). Cambridge: Cambridge University Press.
- Säljö, R. (2006). *Læring og kulturelle redskaper: om læreprosesser og den kollektive hukommelsen [Learning and cultural tools: About learning processes and the collective memory]* (S. Moen, Trans.) Oslo: Cappelen akademisk forl.
- Tapscott, D. (1998). *Growing up digital: the rise of the net generation*. New York: McGraw-Hill.
- Uricchio, W. (2005). Simulation, history, and computer games. In *Handbook of computer game studies* (pp. 327–338). Cambridge, MA: MIT Press.
- Utdanningsdirektoratet. (2013). Social Studies Subject Curriculum. Retrieved September 4, 2017, from https://www.udir.no/kl06/SAF1-03/Hele/Grunnleggende_ferdigheter?lplang=http://data.udir.no/kl06/eng
- Vagabond Dog. (2014). *Always Sometimes Monsters* [Computer game]. Austin, TX: Devolver Digital.
- Wartofsky, M. W. (1979). *Models. Representation and the scientific understanding*. (R. S. Cohen & M. W. Wartofsky, Eds.) (Vol. 48). Dordrecht: D. Reidel Publishing Company. <http://doi.org/10.1007/978-94-009-9357-0>
- Wenger, E. (1998). *Communities of practice: learning, meaning, and identity*. Cambridge: Cambridge University Press.
- Wing, J. M. (2006). Computational Thinking. *Communications of the ACM*, 49(3), 33–35. <https://doi.org/10.1145/1118178.1118215>
- Åkerfeldt, A. (2014). Re-shaping of writing in the digital age: A study of pupils' writing with different resources. *Nordic Journal of Digital Literacy*, 9(3), 172–193.