

Storytelling with Augmented Reality: Research and Creative Practice

Jacqueline A. Rives

This case study explores an introspective method for field work in order to identify directions for future research and practice in digital storytelling with Augmented Reality (AR). It is often said the AR enables new forms of storytelling. While many projects incorporate components of storytelling, their aim is not focused on creating a more generalized theory of digital storytelling. Storytelling is essentially a social activity. AR research tends to focus on the technology, design and development practices, and the impact it makes on users. Recently, large-scale mobile AR games, and easy to use AR writing tools have focused attention on mobile AR users in the field. Fieldwork in social AR storytelling events offers opportunities to study the social aspects of a mediated storytelling experience. In this case study, I adopt a holistic approach to AR storytelling. Here I describe the design decisions and social interactions observed in an AR walking tour project and compare these descriptions to a typical oral storytelling experience. From this analysis, I consider potential applications of this research model to future AR storytelling research and creative practice.

Keywords: augmented reality, digital storytelling, mobile AR, social storytelling

Introduction

In any culture stories are an important way that people package and share essential knowledge and beliefs for their communities. I had a deeply moving reminder of this during a Media Talk event at our university. The event was a screening of the docudrama movie about the atomic bombing of Hiroshima followed by an interview with an assistant director's grandson and a question-answer session with the audience. There were many poignant moments: I saw events that I've only read about come to life as the actors re-enacted the bombing and aftermath, and I heard that the remaining survivors who acted as extras are gradually dying out: the film is what remains of their experience. Some audience members shared their own family's experiences. One audience member commented that the fact that the Media Talk event was held outside of a museum and in a familiar setting and included discussion time among participants, made both the movie and the A-bombing itself more personally meaningful to her.

In the Hiroshima Media Talk event, participants could experience the story of the Hiroshima A-bombing in a more profound way than only by reading about it, or seeing the movie, or talking about it. There were multiple story threads that participants could engage with, in both mediated stories in the movie and live oral stories in the interview and discussion. During the discussion, story threads became entwined and this entwining lead participants to deeper empathy and understanding of a significant event in human history.

Conceptually, this example illustrates what might be special about storytelling with Augmented Reality (AR). AR interfaces are designed to retrieve multimedia content and map it onto people's real physical locations. Users interact not only with the multimedia content, but may also be interacting with people and objects in their surroundings. Many AR apps for mobile devices also include social media tools where users can upload or share information related to their AR experience. Similar to the Media Talk event, AR technology provides opportunities for users to engage with multiple narratives across the mediated and real worlds, and to connect mediated and real world experiences.

During the Media Talk event, I found myself imagining ways that I might tell the Hiroshima story with AR: a city walk with images of survivors' artworks that appear at significant places, or an event that invites people to tag places with peace prayers. While I see AR as a medium for storytelling, this is an emerging use for the technology. Initially commercial, AR applications and equipment were developed to train people to work in complicated 3D visual environments like doing surgery or equipment repair. As marker and image-based tracking technology became more widely available for personal computers and more recently mobile devices equipped with cameras and other sensors, AR projects and applications have spread across many areas of our lives including the culture industry, and education. While commercial systems may be custom-built and AR experiences custom-designed for a particular setting, there are now Open Source kits available for both professionals and enthusiasts to create new AR applications and AR applications that let people without programming or design training create AR content. AR started as a technical tool and is now touted as a new way to tell stories.

Research Context

In an article on a corporate website offering AR branding services, Torsten Gross et al. define AR storytelling as a compositing process of three layers that work together to drive meaningful social relations. Writing in a marketing context (brackets my own), they say (3):

We understand storytelling in three basic layers: experience, story, and narrative.

When [carefully orchestrated], storytelling can build a [powerful and authentic] connection between [your brand] and [your customer], no matter the medium or channel.

Experience: A lived event or moment within a larger story that can influence a story's outcome. Experiences that connect to a story are more memorable and more emotionally powerful

Story: A linked series of events that takes a character from one state to another.

Narrative: A system of stories that links values and events to establish broader cultural meaning.

The bracketed words relate specifically to the authors' business context. These words [carefully orchestrated], [powerful and authentic], [your brand], and [your customer] provide their rationale for using designed AR experiences for commercial purposes. They also suggest consumers have an active role in the experience: they get to choose how the experience matters to them and whether or not it moves them to do business with the company offering the experience (4). In their sales pitch, they are positioning the AR experience design as an "engine" that businesses (and their customers) can use to "drive" change.

Underlying the commercial motives in the sales pitch is an understanding that AR storytelling involves a dynamic social process where participants use contextual information, story structures,

and cultural frameworks to navigate and negotiate changing states in their social relations. This view represents an emerging perspective on AR storytelling both in the creative and academic communities that situates AR in social and cultural contexts and explores how people interact with their devices, new technology, and each other in meaningful and transformative ways. The most basic question AR raises is this: How does this technology enhance and transform our lives? Looking at narratives surrounding AR, we can see several answers to this question.

The developer narrative has understandably been focused on the AR technological innovation. Their story is: optimize the technology to enhance the human experience. The field of User Experience (UX) is well developed (see studies in Huang et al.). Reviewing design guidelines, UX designer Anna Chakravorty (User Experience) identifies three areas of best practices in the field of mobile computing: “environmental design,” “interaction design,” and “visual cues.” Environmental design and visual cues are about optimizing the device’s performance and presentation systems to make mobile devices more responsive and appealing to users in various contexts. Interaction design seeks to improve the interactions between people and systems. In mobile AR (MAR), both application and human navigation is a central focus for developers. Interaction design developers have used narrative and story to map the system architecture to users’ mobile experiences as they move to different locations with their mobile devices (Braun section 3), which has led to AR game development and a perspective that AR transforms our experience of story: in an AR experience, people enact or “do” stories (Allen et al 264-265).

The narratives in the “edutainment” industry are about using AR to augment services or practices in the field. In the culture industry there are a variety of AR experiences involving story and narrative such as interactive museum exhibits (Neuburger and Egger), tours (Kečkeš and Tomičić.), and augmented theatre experiences (WNIP). These projects are often developed as attractions to a particular place. At schools, classroom teachers are encouraged to incorporate new technology across the curriculum to provide new and engaging experiences with subject matter. For example, Education Technology consultant Dr. Monica Burns, recommends an application with AR writing tools and pre-loaded images to teachers in order to facilitate active learning experiences in creative writing and geometry (Burns Wintertime Story). The “edutainment” narrative is about doing familiar activities differently or using the experience to discover something new; a narrative about people using AR as a tool to transform perceptions.

The story-maker narrative focuses on innovative ways people can tell stories with AR technology. For example, Mikaela Jade, an Australian indigenous woman, works with communities to share their stories and cultural heritage with AR. In one project, members of a community can use an AR app to reveal information about icons left by their ancestors, connecting themselves to their history and their community (Barbaschow Indigital). Her story is in part about making meaning. Developer Ronald Azuma believes that AR storytelling experiences are holistic. He suggests that the core of an AR experience needs to rely on the composite of virtual and real components, and the composite creates a larger meaning that is different from each component individually (Azuma section 11.1). The other part of the story-making narrative is about people creating socially meaningful experiences. Walking in a public place, being part of an experience group, or using social media in the experience all mean that for users in these situations, there is a social component in the mix. In this sense, and in projects like the ones Mikaela Jade facilitates, AR storytelling events become opportunities to “do community.”

All of these narratives are concerned with how people, AR technology and story interact. The academic research community is concerned with developing theories to describe these

relationships, and the creative community is actively exploring those relationships in project work. In each of the narratives, story and narrative are structures people use to negotiate their relationships with technology, but these narratives are not necessarily focused on the social dynamics that lie at the heart of a storytelling experience, nor do they seek to develop a more generalized theory of digital storytelling. Towards building a theory of digital storytelling, we need narratives that investigate mediated relationships between storytellers and people participating in a storytelling experience. As foundational work for both academic research and creative practice, we also need methods that let us observe and reflect on the dynamic interactions of people, narrative, and technology in actual digital storytelling events.

In academic research and in creative practice, there are at least two strands of approaches for studying and exploring AR storytelling projects. Conceptually both resemble augmented reality. In the first approach, multiple perspectives are composited. People from different fields collaborate on a project or a single researcher designs a project and analyzes from multiple perspectives. They collect quantitative and qualitative data and analyze it from various existing perspectives on the assumption that overlaying different viewpoints may produce new insights and theories that are more robust than each of the individual ones. UX projects, and reviews of best practices follow this strand.

In the second approach, researchers focus on the topic of technological change and its impact on people's communication practices. In this approach, academic researchers compare changes in communication practices against existing communication practices and theories, in order to see what the new technology disrupts and enables. Through field work, researchers collect and analyze quantitative and qualitative data from actual experiences with communication technology. The assumption here is that overlaying two sets of practices will enable a more robust understanding of the interactional dynamics of an experience and lead to insights and theories about how people interact with technology. Research on the affordances and constraints of AR technology and more recent studies on how mobile users interact with their spatial and social environments during AR experiences are examples of research developing this strand of research.

Combining the two approaches, in the remaining sections of this paper, I develop a case study in order to explore a method of qualitative research into that might be used to investigate the dynamics of AR storytelling events. Two basic questions frame the case: What happens when people make AR storytelling experiences? What can MAR researchers and storytellers learn from each other? The case study describes the creation and experience of an AR walking tour of our campus with human and avatar guides. This project was developed for high school students thinking about entering our university. I will analyze the design process and experience dynamics according to an idealized model of traditional oral storytelling and discuss implications of this research model for research and creative practices in AR storytelling. The AR walking tour was a collaborative project between myself and a student in my third-year seminar. She has offered consent for the use of her images used in this study. The descriptions of the design process and planning are my own written recollections. The visitors who joined the tour are anonymous and no personal information from them was collected. I would like to thank everyone for their participation, and most especially my student for her hard work on the project.

I will present the case study as three narratives. The first narrative is the story of the story-making and event planning and I will tell it in the context of my seminar activities. I will situate the AR Experience in its cultural context and describe the story structure that formed the backbone of the tour event. The next narrative is the story of the experience itself and I will tell it

from my perspectives as an observer and as a participant. In this narrative, I will be treating the AR avatars as people and provide a description of what people, avatars included, said and did. The following research narrative is the story of the relationship of the case study experience to traditional oral storytelling and practice. In conclusion I will discuss some directions for future AR storytelling research and creative practice inspired by this case study.

Cultural Context

Exam Hell is what Japanese call the pressure students experience as they go through the educational system. The pressure is especially intense for third year high school students, who after years of schooling and testing, overtime at private “cram schools,” and sleep-deprived nights of studying into the wee hours of the morning, are faced with passing an entrance exam to get into their desired universities (see fig. 1). Exam Hell is peopled with stereotypical characters like *kyoiku mama*, mothers who push their kids through the system; and *ronin* who keep taking entrance exams for as long as it takes until they are accepted into a top-class university. Students and their families endure Exam Hell with the hopes that a good university education will lead them to good jobs and a stable future. One blog writer describes her son’s passage through Exam Hell as something more like purgatory (Kawagoe, title). Purgatory is a kind of a limbo land where students like her son can see where they want to go, but they need to undergo a change to get there.



Fig. 1. Entrance exam day signage
Photo taken by author



Fig. 2. Media pamphlets at Open Campus
Photo taken by author

One of the first encounters high school students have with their potential university community is attending Open Campus events. On the Open Campus day we did the AR walking tour, visitors were immersed in the university’s culture. Our department along with all the others, were holding various events: orientation sessions about the department, demonstration classes, and special events (see fig. 2). Visitors interested in Media could attend a website programming class, join a comic design workshop and meet students and teachers at seminar poster sessions. They could also meet one the avatars for a sneak-peak of the AR Experience in the poster session area. We actually ended up with a small group for the AR walking tour. As several interested visitors told

me later, there were many things for them to do. For high school students and their families, it is hard to get a break from Exam Hell.

When new students enter our Information and Media Studies Department (Media), they are usually keen to acquire new knowledge, skills, and certifications that will be useful to them in their future jobs. Some students want to do creative work with computers and others want to pick up computer skills while learning more about pop culture or business practices. Computers and communication technology are woven into the narrative of our department culture: we wonder how to preserve it, we actively use it, and we ponder new uses for it. Culture underlies this narrative. When students move through our classes and curriculum they encounter an interdisciplinary faculty who together take a humanities-based approach to communications technology. Our curriculum is designed to meet students' expectations, but also take them into an uncertain future. On top of the practical skills, we also try to nurture flexible thinking to deal with unpredictable changes that new communication technology brings, and our program values "people skills." When I later talk about "Media Girl," I am talking about this narrative: nurturing students who are not only tech-savvy, but are also knowledgeable about communications culture, focused on people, able recognize possible connections between technology, people and culture, and who can activate these "soft skills" in new situations.

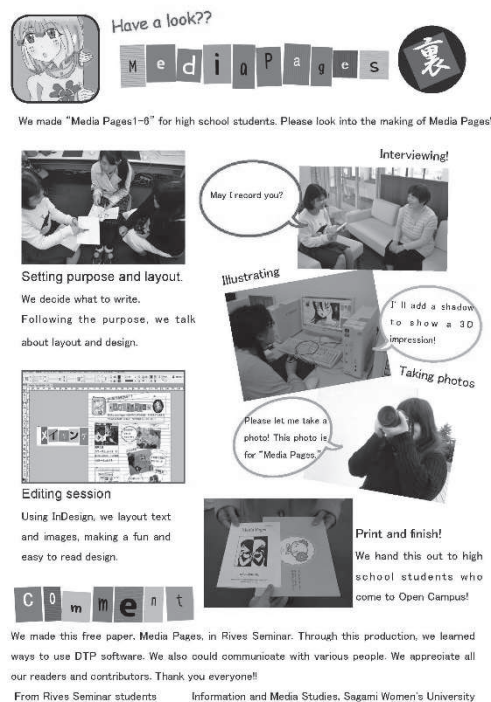


Fig. 3. Flyer for Open Campus from Media Pages 6
Students' work

One of the key transformational experiences Media students have on the way to becoming Media Girls is the required third and fourth-year seminars. Each teacher has a small group of students that do individualized research and projects in their mutual fields of interest. My own seminars are about digital storytelling. In the third year seminar, we do story-based class projects where students learn about storytelling processes, brush-up their skills with digital tools, and gain experience creating for and presenting contents to an audience (see fig. 3). In the fourth year graduation project, each student tells their own story in their choice of media. During the course of

my work, students have created many interesting and moving works in many kinds of media: magazines, animated comics, and websites to name a few. Since storytelling is a social event and we are doing this in a learning context, collaboration and exploration are two things I try to facilitate. I also feel it's important for everyone to share their stories and I encourage third year students to connect with the older students and reach out to younger students, too, hopefully building a community of practice connecting people through stories. One way I try to do this is to involve my classes in Media outreach activities for Open Campus. Through these Open Campus activities, I also hope that prospective new students can encounter real Media girls and have a concrete experience of Media Girl culture. The AR walking tour project was born in this environment.

Design decisions and event planning

The AR walking tour was the first time for my student and myself to work with AR as a storytelling medium. I had seen student guides showing prospective students the campus, doing the typical tour guide presenting information routine. For the AR walking tour, we wanted to engage people in a conversation. We wanted to talk not only about how Media students spend their time on campus, but also about how Media students change and grow; about imagining future selves. In my seminar, we were having the same conversation. The project concept was sharing our stories: sharing a journey. We conceived of the tour route, AR contents, our individual stories, and the interactions among the participants as experiential elements for supporting this conversation and concept.

The story design starts with an invitation to interested high school students and their family members to walk with a Media student (and teacher) to various points of interest on campus to learn about Media students' school life. We chose locations where Media students typically spend time. At each point of interest, the high school students use an iPad to reveal an AR avatar. Text information with the avatar explains the significance of the location to Media students. These messages are written in a friendly, conversational manner, to serve as storytelling prompts for the human guides to talk about their own experiences, and cues for the participants to ask questions and share their stories.

For the route and story line, the points of interest were sequenced into a route which mirrors the life path of an incoming student transforming into a member of society. To structure the tour story, we identified locations where Media students spend time on campus, and organized a route in which the physical route mirrors a Media student's academic progress during their four years of study. The route starts and the tour group meets at one of three Media event venues at Open Campus. After that, the group goes to a location where first year students have some required classes, moves to locations where second year students start becoming more independent, continues on to where third year students have their specialized classes, detours to a popular break place, and goes to the building where fourth year students typically prepare and present their graduation projects. Participants can choose to end the tour here, look for other avatars in the building, or visit a last point of interest at the "Dreams Fulfillment" Center (student services building which houses the career guidance office). The route has a recognizable story arc of beginning, middle, and end that mirrors students' transformations in space and time. However, the story itself is a kind of cliffhanger. The visitors get to decide how the tour story ends as well as whether or not they are interested in following this path in their own life's journey.

For the AR virtual guides, we discussed several options: using a generic “Student” avatar, using our Media mascot Jojo, or doing something different. While a “Student” avatar or the Jojo mascot would let us tell a coherent, branded story, we felt that a variety of characters better suited our concept of meeting people and sharing stories. We opted to use an original set of avatars designed as people personifying the architectural characteristics of each building used as a point of interest (see fig. 4). The added benefit was that the avatar design could become part of the conversation if visitors were interested. Jojo does have a cameo appearance at the end of the tour. This placement lets us talk about the Media student who created it during an internship, and create a branding moment that does not detract from main concept of the tour. At the same time, it reminds everyone of the cultural narrative: to get out of Exam Hell and move into the next stage in life.



Fig. 4. Character design concept for Library avatar.
Photos: taken by author; Story board: student work

To generate the story prompts and rehearse our stories, we prepared a storyboard on Power Point. Each slide had a photo of a campus building, its avatar and the avatar’s description. Then we talked about classes and our other experiences in the building. We singled out some significant experiences and then we wrote text for the avatars. The messages were greetings and short messages about what Media students do in that building. We felt that rather than just giving information, surprises would work better as conversation starters. So, for example, instead of having the Library avatar say “Hi! You can find a lot of good books here,” we opted for “Hi! Maybe you came here for a good book, but you’ll probably find some Media Girls working on projects.” This prompt naturally leads to the question, “What kind of projects?” which the guides can elaborate on with stories about research or project work they have done for the library such as pamphlets and displays. This approach also invites people to think differently about the space they are in, and gives participants a moment to pause and think about what the contents mean to them.

With the storyboard in hand, we were ready to tag the buildings. Since we planned to use an iPad for the tour, we had several choices of tools. The big decision was between using a marker-based AR app or a geo-positional AR app. Marker-based AR requires placing a physical marker at a location which users scan to open the AR content in their device's video camera stream. Geo-positional AR uses the user's geographical location and algorithms to place the content in the video camera stream. Since the geo-positional trigger is invisible, we felt that it required a more active search process than the marker-based system available to us, and as such geo-positional AR was more compatible with the overall Media Girl narrative of active learning we were trying to develop.

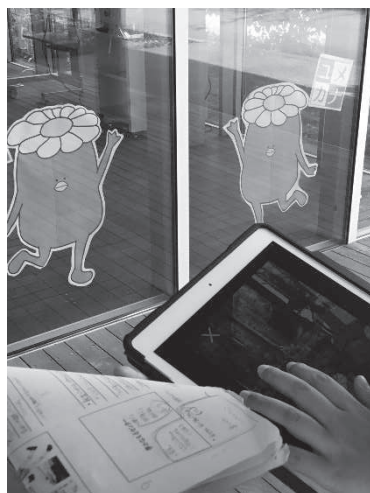


Fig. 5. Tagging with storyboard
Photo taken by author



Fig. 6. Augmented view with Jojo
Screenshot from WallaMe app
www.walla.me/

We chose WallaMe, which is a free application available for iOS and Android devices (www.wallame.com). With WallaMe, a user creates a “Wall” by taking a photo of a wall or other flat surface and associating text and images with the location of the photo (see fig.5). When a later WallaMe user who is in the same physical location scans the scene with their device's video camera, WallaMe places the associated contents over the live video of the scene, creating the AR composite (see fig. 6). WallaMe also has some social media tools. Since we did not want to collect personal information, we chose not to use them in this version of the AR walking tour. Some other AR writing apps can handle video contents and have game tools, but Wallame works for delivering our tour contents. It is easy to use and it took about an hour to tag the buildings on our route.

One design change we made in the field was the avatar placement. Originally we planned to place the avatars near the building signage. Instead we placed them near entryways. We felt these areas were a more natural meeting place for an AR avatar guide to welcome their human guests. In hindsight, using the entryways was also a better narrative choice. By actually opening the doors we could invite participants to physically explore the route and by extension invite them into our Media culture. In terms the larger cultural context, these passageways mean a way out of Exam Hell and a way into a new stage of life. In placing the avatars where we did, we were able to join personal, social, community, and cultural narratives into a coherent story and do so in a way that is meaningful to individuals, groups and the community in the context of space and time. Taken together, the virtual contents and the surrounding stories represent transformations and in this case, potentially life-changing moments.

AR Experience

The group who participated in the AR Experience group consisted of two high school students, two of their parents, my seminar student, myself, and the avatars. People walked and the avatars travelled in cyberspace through an iPad loaded with WallaMe. I participated as myself, a Media teacher. To give a sense of the storytelling that happened along our journey and some of the narratives that developed, I will be describing interactions I observed and participated in: conversations among the various groups that formed as we walked, and interactions of the whole group at the Wall locations. This description should not be considered as a complete and unbiased record of the experience. It is a collection of stories about the event as I experienced them



Fig. 6. Open Campus AR walking tour
Welcome at Wall 1A (AR view)
Screenshot from WallaMe app

Our AR Experience group assembled after the demonstration class outside that classroom. The beginning stage of the tour was an orientation. At Wall 1B, we welcomed the four participants. The student guide greeted everyone, explained the tour concept and avatar design, and demonstrated how to search for the avatars. I also invited participants to search for information, to informally chat and feel free to ask us about our school experiences. One of the parents was curious about the AR technology and our reason for using it. He asked about WallaMe's programming language and if we were using it as a means of entertaining our guests. Walking to Wall 1C, I told the group that I didn't know about the programming language; we were experimenting with AR as a means of communication. Arriving at Wall 1C, the student guide gave everyone a turn to confirm they were comfortable using WallaMe and there was much excitement here when each revealed the avatar. With everyone oriented to the tour and the app, we moved on to the middle stages of the route to discover more avatars.

Walls 2 through 6 were the middle stages of the tour where we had escalating problems with the AR display. Things started out smoothly at first. Walking to Wall 2, one parent-daughter group walked with me and the other with the student guide. Both groups talked about our storytelling seminar and other Media classes. At Wall 2, each of the high school students found the avatar rather quickly and showed it to their parents. Here the avatar says, "Hi! This is where we take classes. There are cool Media events here, too." One of the parents asked about what kind of events

we hold. The student guide told the group about two Media Talk events she went to; one with a movie director and one with a comic book artist. The high school students were really interested in this, so they chatted merrily away with the student guide about movies and comic books as they walked together to Wall 3. We were on our way to the library. The parents stayed with me to ask about my research activities.

At Wall 3, our problems started. No one could find the avatar. At one point, the avatar flickered in briefly and then we lost it. While waiting, the student guide and I used the opportunity to talk about what this space means to us: a place where we each had worked with library staff to produce pamphlets and the site of a current exhibition I curated showcasing the university's awards for students' innovative graduation research projects. The visitors said they were surprised that we didn't talk about the library's collection, and asked for more stories about project work. The area around Wall 3 then became congested with other people, so we decided to move on. On the way to Wall 4, we walked together as one group and the student guide and I shared our story of designing the AR Experience.

At Wall 4, our technical difficulties escalated. The high school students found an avatar, but it was the wrong one. The Wall 3 avatar finally found us, but it popped on the Wall 4 video stream. The student guide found the composited photo WallaMe saves when tagging. She showed it to the group and talked about the character design for Wall 3 and Wall 4's avatars. The text prompts stories of the space being a place where students can meet teachers. Improvising, the student guide began showing the group how the app worked. Pulling me aside, the two parents asked about what kind of research the other Media faculty members do. When both conversations were finished, we moved to the next Wall. As we were moving, my student and I talked about what we could do in case of further difficulties, and each parent-daughter pair made plans for after the tour.

At Wall 5, our technical difficulties reached a peak: None of the avatars showed up. Not one. Nothing happened. Again the student guide offered her story of the space with the composite photo. Since there didn't appear to be anything we could do to get WallaMe working, I asked the group if they wanted to continue as a conventional tour, or to move on and try one more time. They opted for another try, so skipping one of our planned stops, (break place detour), we headed to Wall 6.

On the way to Wall 6, I told the group the story of why the destination was special. With studio labs full of computers, professional equipment and software, and lots of hard-working students, it is the place where "Media Girls" are born and raised. Arriving at Wall 6, the high school students seemed excited to see the video and sound-editing studio waiting there. They were even more excited when they pointed the iPad at the Wall space, and Wall 6's avatar popped up immediately. Everyone clapped and cheered when this happened. The high school students asked for more, so we moved to Wall 7, the last stop; the DTP studio where we designed the AR Experience.

At Wall 7 the avatar popped up again very quickly. The high school students were surprised that the avatar was not the same as the others, and one of them asked why it was different. Wall 7's avatar was Jojo, the Media mascot, who simply says "Hello!" in English. This was my cue. I directed their attention to the department pamphlet in their "swag bags" they received at Open Campus registration, and told them that this avatar was there to mark the end of the tour, but also to invite them to think about how they might continue their future journey. Branding moment over, we thanked everyone for coming. Although the student guide and I were frustrated about the technical problems, our guests all said they had an enjoyable and interesting experience. One of the high school students said she especially enjoyed the game-like experience of using the AR app in the context of the tour.

Augmented Storytelling

People enjoy storytelling experiences for many personal reasons. Stories engage us because they connect us with other people. Storytelling is a social experience: oral storytellers craft their stories to engage with their audience. In the Japanese comic storytelling tradition *rakugo*, for example, storytellers sit facing their audience, greet them with a bow and engage in some banter before launching into a story. In performance, *Rakugo* performers tell the story as different characters with some limited props, but they are not actors. A *rakugo* performer is aware of his audience and will adjust his story to the timing and details to the audience's reactions. Both the performer and the audience are aware that the *rakugo* performer is a real person telling an entertaining story to the group of people who have gathered to hear it.

To keep people engaged in the social interaction, traditional oral storytellers may have a main story that they want to tell, but they also have plans for keeping things interesting. Oral storytellers develop their narrative by bringing in other bits of stories and interweaving other narratives. In *rakugo*, a performer usually starts off a story by showing his audience a stereotypical character on a normal day. Then he puts that character in an unexpected situation and starts telling a story about what happens. Just when the listeners begin to get some idea of how things will turn out, he reveals a different narrative that is really driving the story. The storytelling experience hinges on a pivotal moment in the performance where the audience recognizes a change in their perception of the narrative. For a *rakugo* audience, the mismatch between the storyteller's information and their own expectations creates the sense of humor in the performance.

Negotiating the gap between the storyteller's whole picture and participants' the partial pictures, and navigating this uncertainty is a social process that moves people through stories. Storytellers present themselves as real people telling a story and work to build rapport with their audience. They talk about characters as real people in situations that their audience can relate to. As they spin out their stories, the people they talk about undergo changes. Storytellers plan and rehearse strategies for revealing those changes. Sometimes they improvise, but storytellers maintain control of their narrative. Storytellers lay down a story line, then disrupt it with surprises. Show, tell, and reveal are basic pattern of story crafting. Interweaving and playing with narrative, storytellers grow their narratives. At certain pivotal moments in a story experience, listeners become aware of the story craft and through this awareness, their perceptions of the experience are transformed.

How was our experience similar? Our concept for the project was definitely social. We wanted to walk and talk together with our guests, telling our stories about the Media Girl culture. We set up a route and advertised the experience show the participants that event was structured as a tour. My student and I presented ourselves as tour guides, but we were telling stories about our own experiences in the places that we visited. Since the tour participants were prospective students and their families, they could relate our stories to a significant milestone coming up in their lives. On the surface, we developed a story of tour talk: where we were going and what we were looking at. Underlying the tour story, we prepared a chronological narrative about changes Media students undergo. At each stop on the tour, we revealed bits of the underlying Media Girl narrative and arranged a surprise to reveal a key pivotal moment: the story wasn't about taking a tour, it was about empowering a significant life change. We augmented the basic oral storytelling experience in two ways: we mediated the experience and we invited participants to join us in constructing the narratives.

In the design process we built a linear structure for the physical walk through space and anchored

focal points for revealing the Media Girl narrative to each Wall site. At each focal point, we placed AR contents. The AR reveal is a composite of avatar and conversational text placed against school building screen and framed in a mobile device screen. The composite tells participants that there are personal, social, cultural, and technological components to the Media Girl narrative. The core piece of information in the AR reveal is the avatar's text message. These messages draw people's attention to the main narrative of Media Girls learning and growth, and they are written in order to get everyone talking about how that process happens. Sociolinguists who analyze the social dynamics of conversation call these useful bits of information gambits. Placing the gambits in the AR contents set up a mediated relationship between the guides and the visitors.

When high school students come to Open Campus, they see buildings, places which could become important places to them someday, but at the moment, they are just buildings. They also come to imagine what it is like to be a student in those buildings: what they will study, who they might meet, and how they might change. Visitors place themselves in a campus tour to create meaningful personal and social relations to space. As guides, we are not fortunetellers; we don't even know exactly what information will be useful to particular visitors. But in our daily lives my student and I do have experience in the campus spaces. As storytellers, we can interpret how all the visual elements in the environment relate to real people inhabiting the Media Girl community, and we can offer a personal connection between families and a community. The gambits in the AR text contents help the group negotiate this gap.

The AR Experience description shows participants socially and physically navigating the tour story and Media Girl narrative. At the start of the tour, the parents negotiated with me about how people should position themselves in relation to the Media Girl narrative. "Was the tour about entertainment or technology?" the father asked. "Communication," I answered. This exchange offered a working agreement that our job as a group was to do the Media Girl narrative by talking about what we encountered along the route. The parents accepted my offer, encouraged their daughters to talk with me and my student, and tried to keep the conversations moving even when the avatars weren't cooperating. The other participants also cooperated to make the Media Girl narrative. The only time the group got diverted was during the walk between Walls 4 and 5, when my student and I talked about how to deal with technical problems and the families were making plans for after the tour.

The AR Experience description also shows participants used the gambits and surprises to drive the Media Girl narrative forward. At the Wall sites early in the tour, parents and sometimes the high school students were asking questions directly related to the text messages or other things in their visual field. As the tour progressed, the high school students began relating what they saw and heard to their own experiences, telling my student and myself how the contents mattered to them. At the Walls where the avatars weren't showing up, the high school students wanted to know what they were missing. Using the screenshots and our own stories, the group figured out ways to keep the tour on track. This indicates that people were engaging themselves in both the social construction of the tour and the Media Girl narrative.

As the participants negotiated the tour, we also began adding branches to the designed linear structure of the Media Girl narrative. The AR Experience description shows that the Wall sites functioned as nodes, sites where the group came together to reveal a story of how that location was significant to the Media Girl narrative. After each reveal, participants either moved to the following Wall as one group or participants clustered into two or three smaller groups. Various groups formed: university student/high school students, high school students/teacher,

teacher/parents, parents/university student, and others.

The times when participants moved as one group were the guided moments when the student guide and I were doing tour maintenance activities and pushing the Media Girl narrative. The smaller “interest” groups were opportunities for people to push their individual narratives. For example, on the way to Wall 3, the group of students used the avatar’s message about Media events to launch a conversation about movies and comics, while the parents used our library destination as an opportunity to ask about my research. In these parallel strands, each interest group talked about relationships of revealed information, personal experiences and individual concerns. In the nodes and branches of the AR Experience, participants constructed stories together create a common understanding of what spending time in the spaces we were visiting means in terms of getting a university education. In the different groupings, the high school students and their families tried out new social relations in their potential new community.

The AR Experience also introduced a new technology into the narrative and social mix. In the AR Experience, improvised talk at the nodes and in the branches was in response to surprises in the AR contents and disruptions in delivery. For example at Wall 4 WallaMe delivered the wrong avatar. My student and the high school students went into a huddle to figure out what to do about it. The high school students asked my student to show them how the tagging worked. This example reveals a key pivotal moment of the experience. Participants were not just looking at buildings, listening to tour guides, and asking questions; they were living moments of the story. In this tagging scene, participants were also changing how the story was unfolding. Since the avatar wasn’t doing its job as a tour guide, the student guide and high school students transformed the disruption into a learning experience. For me as a teacher, this was the defining “Media Girl” moment in this groups’ construction of the story: people connecting, communicating, and changing through encounters with technology and each other.

AR Storytelling: Research and Creative Practice

The case study here is designed to explore an introspective method for field work in order to identify directions for future research and creative practice in AR storytelling. Both research and storytelling and research share common aims: to put subjects in a certain situations, introduce changes, observe what happens, and in the process transform our understanding of a situation. Conceptually, the holistic approach to the AR walking tour represents a form of experimental research. In the design process my student and I tried to define salient relationships between narratives and people in a story. The concept for the AR project represents our best guess about how people, narratives and technology would interact in certain conditions. In the AR Experience we activated that guess in real conditions. Using gambits and the storytelling structure of show, tell, and reveal we systematically delivered changes to those conditions. In our project, real people in clearly defined personas were talking and interacting with each other. As a researcher, I could observe and reflect on what occurred. I think this research design, with its combined design, storytelling, and interactional frameworks, could be adapted for research that looks into the relations of people, technology and cultural narratives, as well as studying social digital storytelling experiences.

Introspective and ethnographic methods are sometimes criticized for presenting anecdotal evidence or personal stories. For example, it might be said that the “Media Girl moment” when the student participants became involved in learning how the AR app works is a story I chose to focus

on because it is personally meaningful as a teacher. Underlying this criticism is a notion that research needs to be structured and systematic, and data needs to be collected in a rigorous fashion. The “Media Girl moment” happened at a specific location at a time when the AR technology was deliberately but unpredictably introduced into a social interaction. It was an observable moment when people stopped telling the socially agreed story and started doing the cultural narrative. Richard Coyne, in his book *The Tuning of Place: Sociable Spaces and Pervasive Digital Media* studies the effects of disruptive mobile technology on human social relations. He believes that people adjust their behavior and their practices with communication technology at sites where different narratives collide. He offers a theory of calibration and scaling to describe the related social dynamics. My case study was not designed to test theories and gather empirical evidence, but adding a recording system and feedback from participants into the research design, I think the reveal structure of the AR storytelling experience might be used to develop empirical research and field test hypotheses such as Coyne’s.

As a storyteller, the “Media Girl moment” was also a key pivotal moment. It reminded me that the event was not just “doing story,” but also “doing community.” The “Media Girl moment” is a reminder that high school students are going through Exam Hell because they want to join another community, and in their new community become someone new. In the tour, we organized the coming of age experience as a timeline. The student participants revealed to me that working with the coming of age ritual experience might be another way to approach the storytelling in this context.

Participants in coming of age rituals are the heroes and heroines of the story: through a ritual experience people undergo a change in the eyes of the community. Arnold van Gennep who first observed the patterns in coming of age rites, suggested three stages of rites: separation, transition, and recognition in the new community (11). Rites are formal, identity-changing ceremonial events. Although the AR walking tour is not a formal ceremony, for the participants the experience is part of a ritual process leading up to two coming of age rites: graduation from high school and entrance ceremonies to a new university. To transform the tour, we might structure the experience more like a ritual. For example, we could ask participants to make or choose an avatar for themselves to carry in the iPads. Instead of guiding the group along the entire route, we might set up an AR maze that they need to navigate to find the location for the key pivotal moment. Then, finding a home for the avatar (and a future space for themselves), we could show them how to tag it on a Wall and welcome them into our community. Being open to other narratives, other structures, other media, and other ways of experiencing story may also help us grow our creative practices with AR storytelling.

In the AR Experience, each person seemed to have different perceptions of the event. One of the high school students said the AR Experience was like playing a game. Personally, I felt like I was involved in a drama, often uncertain if I could save the group from an unpredictable event. The parents, with their questions about my research and teaching, and standing back at times to watch their daughters interacting with my student and myself were sizing up a potential pathway out of Exam Hell. My student said at different times she was tuned into different things. Sometimes the experience was a game, sometimes a drama, and sometimes it was “Project Presentation Hell” for her.

I think that game, drama, and ritual are different layers of telling the same story; that people have personal, social and cultural frameworks for dealing with changing states in their lived experiences. Stories, including those told with AR, help people navigate these changes. In this paper, I have looked at how the creative process might support research, and considered how this research might inform future AR storytelling experiences. As a new user, I was intrigued by the claim that

AR offers new ways to tell stories. This case study suggests that the story-telling engine hasn't changed: storytellers can put show, tell, and reveal to work in an AR experience. As storytellers, my student and I augmented the experience with a visual layer and technical layer of information. The difference was that the AR Experience was a lived mediated moment that we were socially engaged in. While we were navigating the tour and negotiating the Media Girl narrative reveal, we were also trying to come to a common understanding of what to do with the disruptive technology. Game, drama, and ritual reflect different perceptions or interpretations of the disruptions.

There are significant events in our lives that are challenging to deal with: entering university, preparing to graduate, having your life changed by new technology (see fig. 7). I believe that socially mediated storytelling experiences, like the AR walking tour project and the Media Talk event about the Hiroshima A-bomb experience can open up conversations about how people might constructively come to terms with these challenging moments in our lives and help us find ways to augment those conversations with new communications technology.



Fig. 7. Graduation Ceremony. Congratulations!

Photo taken by author

Works Cited

- Allen, Patrick T, et al. "Urban encounters unloaded: Towards a descriptive account of augmented space." *Augmented Reality: Empowering Human, Business and Place*. Edited by Timothy Jung and M. Claudia tom Dieck, Springer e-Books, 2018, pp. 259-276, doi: 10.1007/978-3-319-64027-3.
- Azuma, Ronald. "Location-Based Mixed and Augmented Reality Storytelling." *Fundamentals of Wearable Computers and Augmented Reality*, 2nd ed., edited by Woodrow Barfield, CRC Press 2015, pp. 259-276, www.ronaldazuma.com/papers/Chapter_Azuma_2nd_Fundamentals_Wearables_AR_final.pdf. Accessed 19 Feb. 2020.
- Barbaschow, Asha. "Indigital using augmented reality for traditional storytelling." *ZD Net*, 8 Oct. 2019, www.zdnet.com/article/indigital-using-augmented-reality-for-traditional-storytelling. Accessed 19 Feb. 2020.
- Braun, Norbert. "Storytelling in Collaborative Augmented Reality Environments." 2003, wscg.zcu.cz/wscg2003/Papers_2003/G03.pdf. Accessed 19 Feb 2020.

- Burns, Monica, Dr. "Tell a Wintertime Story Using Augmented Reality." *Class Tech Tips*, 28 Nov. 2018, www.classtechtips.com/2018/11/28/augmented-reality-storytelling/. Accessed 16 Feb. 2020.
- Carmigniani, Julie and Borko Furt. "Augmented Reality: An Overview." *Handbook of Augmented Reality*. Edited by Borko Furht, Springer e-Books, 2011, pp. 3-46, doi: 10.1007/978-1-4614-0064-6.
- Chakravorty, Anna. "User Experience Design Principles for Mobile Augmented Reality Applications." *Inborn Experience*, 9 Oct. 2018, www.medium.com/inborn-experience/user-experience-design-principles-for-mobile-augmented-reality-applications-8ac0e5ebcda. Accessed 16 Feb. 2020.
- Coyne, Richard. *The Tuning of Place: Sociable Spaces and Pervasive Digital Media*. MIT P, 2010.
- Gennep, Arnold von. *The Rites of Passage*. U of Chicago P, 1960.
- Gross, Torsten et al. "A new age of storytelling: How digital reality could help marketers tell better stories." *Deloitte Insights*, 27 May 2019. www2.deloitte.com/us/en/insights/topics/emerging-technologies/digital-reality-storytelling-brand-marketing.html. Accessed 18 Feb 2020.
- Huang, Weidong, et al, editors. *Human factors in augmented reality environments*. Springer e-Books, 2013, doi: 10.1007/978-1-4614-4205-9.
- Kawagoe, Aileen. "Putting my son through his paces for college entrance exams is more like purgatory, than hell." *Education in Japan Community Blog*, 29 Feb 2015, www.educationinjapan.wordpress.com/2015/02/28/going-through-the-paces-of-college-entrance-exams-is-more-like-purgatory-than-hell/. Accessed 16 Feb 2020.
- Kečkeš, Anabel L., and Igor Tomićić. (2017). Augmented Reality in Tourism - Research and Applications Overview. *Interdisciplinary Description of Complex Systems*, vol.15, no. 2, pp.157–167, doi: 10.7906/indecs.15.2.5.
- Neuburger, Larissa and Roman Egger. "Augmented Reality: Providing a different dimension for museum visitors." Jung, Timothy and M. Claudia tom Dieck, editors. *Augmented Reality: Empowering human, business and place*. Springer e-Books, 2018, pp 65-78, doi: 10.1007/978-3-319-64027-3.
- WNIP. "Augmented Reality Storytelling: National Geographic's Partnership." *What's New in Publishing*, www.whatsnewinpublishing.com/augmented-reality-storytelling-national-geographics-partnership/. Accessed 3 Feb. 2020.
- Wallame, AR application. Wallame Ltd, www.walla.me/ Accessed Feb. 19, 2020.

