

Digital spatial story lines:
Constructing historical contexts through
geo-storytelling with archival media

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Abstract

This project explored how participants combined archival media with physical locations to construct narratives as a form of personal meaning making and learning about the past. The story texts, curated as tour paths through the city, were authored using digital mobile technology to produce Digital Spatial Story Lines (DSSLs) on the themes of the Civil Rights Movement and American Roots music. The main question was: does the practice of making and taking DSSL tours lead to the development of historical knowledge and understanding? This research used constructivist theory (Vygotsky, 1978; Hein, 1995; Jeffery-Clay, 1998) as a theoretical framework, which views learning as the assimilation of new knowledge into existing representations through social interactions. It also draws on Falk and Dierking's (2008) Contextual Model of Learning in informal settings which assumes that as learners view objects in a physical setting, such as artifacts, historical locations or archival material, they make meaning from them by incorporating them into pre-existing representations which they hold in their unique personal and sociocultural context.

Participants completed geo-storytelling tasks with pre-selected archival media at the beginning and end of the DSSL lesson sequence. The pre- and post-task stories were then analyzed to look for changes in the participants' contextual understanding of historical events. Data analysis suggested that the practice of creating DSSLs allowed participants to develop historical, spatial and temporal understanding of historical locations and create personal meaning from archival material. DSSLs provide a set of activities and experiences to support the learning agenda of cultural heritage institutions, such as museums and libraries, whose mission is to educate the public using archival material. This curriculum practice builds on recent research into the affordances of using digital technology in history education (Dijkers, Martin & Coulter, 2012; Dijkers, Mathews, Litts & Holden, 2012).

Keywords: narrative, archival material, learning on the move, digital mobile technology, geolocation, constructivist theory

Digital spatial story lines:

Constructing historical contexts through geo-storytelling with archival media

History is all around us - it would seem to be unavoidable, and yet it is possible to be in a place and have no understanding or connection to what has happened there in the past (Graham, 2009). This project examines how archival media and learning on the move (Taylor, 2017) with digital mobile technology can develop historical knowledge and understanding. Participants interacted with maps and archival media and explored city locations on foot, using digital mobile technology to create tour paths centered on themes of American Roots music and the Civil Rights Movement.

Historically, archival material has been the preserve of institutions such as museums and libraries. If people wanted to find out about local history then they needed to visit these institutions to view the artifacts that curators have chosen to display (Schauble, Leinhardt & Martin, 1997). Visitors to museums were readers of a story already been written by the institution. They were placed in the role of a passive consumer of knowledge. However, in the technological world of today a visit to a museum no longer begins as visitors walk through the door nor does not need to end when they exit (Samis, 2008). Museums are increasingly becoming places where visitors explore and interact with artifacts, encouraged to make their own interpretations of the stories the archival objects can tell (Jeffery-Clay, 1998).

This project explored how people combined archival artifacts with physical locations to construct their own stories as a form of personal meaning making and learning about history. The stories the participants curated, in the form of tour paths through the city, were authored using a form of digital mobile technology. This allowed the geolocation of media collected in the field

whilst on the move in combination with archival media gathered during research in public institutions. This paper will explore background research in the areas of learning with archival material, the use of digital mobile technology to facilitate learning on the move and the role of being in place to allow for the geolocation of stories. The context for this project was a Human Geography class involving seven pre-service social studies teachers who participated in a series of 5 lessons where they researched, curated and took tours of a city. The 5 lessons were bookended with spatial storytelling tasks which were used as an assessment of their learning prior to and following their tour making and taking experience. These pre- and post-task stories form the main object of analysis for this project which identifies interactions during their tour making and taking experience where historical knowledge and understanding was actively constructed. This paper concludes with the implications of this curriculum experience and considerations as to how taking archival material out of institutions and placing it in context using digital mobile technology may provide greater opportunities for people to make their own personal meaning of historical events.

Background

The role of museums is to collect and preserve cultural heritage objects, to use them to conduct research and to put them on display to educate the public (Jakobsson & Davidsson, 2012). The education mission of museums however is complicated by the fact that the process of collecting and curating exhibitions usually removes the object from its context. Recent research into visitor learning in museums has looked at tools which could be used by exhibit curators and museum educators to provide more context for the artifacts they display (Falk & Dierking, 2008; Sakr, Jewitt & Price, 2015; Procyk & Neustadter, 2014; Charitonos, Blake, Scanlon & Jones,

2012). This project explores the use of digital mobile technology which can be used to facilitate learning with archival material by allowing users to explore artifacts in the context of the locations where the objects originally came from.

Learning using archival material

The starting point for this project is the acknowledgement that learning, or meaning making, is a social practice whereby people engage with the world around them and other people using socially and culturally specific resources in line with their interests (Charitonos et al., 2012). When visitors enter museums, their encounters with the exhibits on display are shaped by the interactions between personal, social and physical factors. Falk and Dierking (2008) have proposed a Contextual Model of Learning in museums which conceptualizes continuous dialogue between an individual's personal context and their physical and sociocultural environments. The personal context encompasses the human capital (Coleman, 1988) which individuals bring with them into the museum. Constructivist theories of learning (Hein, 1995; Parry & Arbach, 2007) highlight the importance of recognizing the prior knowledge, experiences, motivations and interests which an individual holds when they enter a museum as this is the starting point for the construction of new knowledge representations (Jeffery-Clay, 1998). From the personal context perspective, it should be expected that the meaning making which individuals do whilst interacting with archival material will be strongly influenced by their pre-existing knowledge, interests and beliefs (Jeffery-Clay, 1998; Falk & Dierking, 2008). Research into personal meaning making in museums has suggested that an individual's motivation for visiting a museum significantly impacts how, what, and how much he or she learns at that museum (Falk, Moussouri & Coulson, 1998), however, given that every person

holds unique motivations, desires and interests museums are challenged to meet the needs of every single visitor.

The sociocultural context describes how meaning making is socioculturally situated as humans are innately social creatures who are products of their cultural and social relationships (Falk & Dierking, 2008). Sociocultural theory emphasizes that learning happens as individuals act in social contexts and their actions are mediated by cultural tools – which can include talk, signs, activity structures and symbol systems (Schauble, Leinhardt & Martin, 1997; Wertsch, 1991). Both artifacts and people (including members of the visitor’s social group, other museum visitors and staff members such as tour guides) are considered as mediating tools because it is the interactions which an individual has with these elements which scaffold new learning (Vygotsky, 1978; Wertsch, 1991; Lave & Wenger, 1991). Astor-Jack, Kimberlee, Whaley, Dierking, Perry & Garibay (2008) have investigated socially mediated learning in museums and drew on the work of Vygotsky’s (1978) Zone of Proximal Development and Rogoff and Lave’s (1984) Community of Learners to describe the impact which social interactions have on visitors as they navigate a museum. Both of these sociocultural theories focus on the interactions which occur as visitors engage with artifacts (both objects and people) in the museum setting. Understanding the social nature of learning and how visitors make meaning from the cultural tools around them could help museums develop physical and online collections which have an impact on the individual (Jakobsson & Davidsson, 2012).

The physical context recognizes that meaning making occurs within a built environment (Falk & Dierking, 2008). Museums are free-choice learning settings where visitors use the affordances of the physical context to facilitate their learning experience. Maxwell and Evans

(2002) have described physical attributes of settings which might impact a museum visit, such as clear signage, lighting, crowding, noise level and feeling of space, as well as psychological processes linked to the physical environment, such as cognitive fatigue, motivation, distraction and anxiety. Visitor meaning making has been shown to be influenced by the ease to which people are able to orient themselves in the physical space – a visitor’s ability to confidently navigate the complex three-dimension space of museum galleries has been linked to what and how much they learn during their visit (Evans, 1995; Falk & Dierking, 2008). Recent research has focused on the role of technology as a factor in the physical setting as it may offer a tool to not only help visitors orientate and navigate the museum space but it could also provide contextual information about artifacts (Mintz, 1997; Nairsmith & Smith, 2006; McCarthy, 2007). Digital technology has the potential to impact the personal, social and physical contexts of museums, both within the walls of cultural heritage institutions but also, more excitingly, beyond the walls into the community.

Personal Context	Sociocultural Context	Physical Context
<ul style="list-style-type: none"> • Visit motivation and expectations • Prior knowledge and experience • Prior interests • Choice and control 	<ul style="list-style-type: none"> • Cultural background • Within group social mediation • Mediation by others outside the immediate social group 	<ul style="list-style-type: none"> • Advance organizers • Orientation to physical space • Architecture and macroscale environmental factors • Design of exhibitions, programs and technology • Subsequent reinforcing events and experiences outside the museum

Table 1. A summary of Falk and Dierking’s (2008) Contextual Model of Learning in Museums.

Digital mobile technology and archival material

Digital mobile technology in museum as a potential tool to help visitors connect artifacts in the physical context with factors in their personal and social contexts (Falk & Dierking, 2008).

Previous research has suggested that digital mobile technology can help to increase engagement with the visitor's physical environment (Nairsmith, Sharples & Ting, 2005), increase confidence, motivation and involvement of students and teachers on school visits (Burkett, 2005 as cited in Nairsmith & Smith, 2006)) and promote interaction with artwork (Proctor & Tellis, 2003). If used successfully, technology can provide background information, tell stories and invite involvement from the user to make a museum visit a more dynamic process. They can connect users directly with distant geological or historical eras, global weather systems and worlds as micro as individual cells and molecules or as vast as the entire universe (Mintz, 1997). Digital mobile technology can be a tool to connect museum visitors to the contextual information surrounding an artifact, allowing individuals to create a more personal, meaningful representation of the object (Charitonos et al., 2012; Jakobsson & Davidsson, 2012; Wertsch, 1991). It is important to note that the possible drawbacks of digital tools include user frustrations if the tool is too complicated to operate and the potential for technology to interrupt the social interactions between museum visitors (Mintz, 1997).

Gammon and Burch (2008) explored technological innovations trialed in UK museums. They suggested that digital technology should be used to enrich visitors' enjoyment and learning by providing authentic experiences mirroring those in the real world, and should allow users to cover topics more closely aligned with their own interests (Gammon & Burch, 2008). Effective digital media experiences require situating archival material in a museum within the wider context of the lives, the community and the society in which visitors live and interact (Falk & Dierking, 2008; Lave & Wenger, 1991). The handheld nature of devices means that visitors can access material whilst not physically inside the walls of the museum to be viewed it in its original context. For example, it is possible to listen to the audio and read the text of Dr Martin

Luther King Jr's 'I have a Dream' speech from 1963 whilst standing on the steps of the Lincoln Memorial in Washington D.C. Pallud and Monod (2010) describe the 'nostalgic bonding' (p. 562) which motivates visitors' to seek out cultural heritage locations where they can connect with their own heritage, creating a highly personal event. Historic sites, monuments and memorials are an important part of the landscape as they are primary sources of cultural heritage information. An application of digital mobile technology is that further archival material can be added as layers to a certain location to create an even more personal and meaningful connection with the past (Clabough Turner, Russell & Water, 2016).

Geo-storytelling: Reading and writing locations

This current project focuses on the potential for digital mobile technology to be used as a tool to engage people in learning about historical contexts. Clabough et al. (2016) advocate visiting historic sites as a primary source of historical information, where it is important to draw students' attention to the story which might have been suppressed in order to tell the dominant narrative. Telling a hidden story or uncovering a lost narrative is a concept echoed in the practice of counter-mapping (Taylor & Hall, 2013) where users gather personal information about places and add layers to a map to display a less dominant narrative. Sakr, Jewitt and Price (2016) used digital mobile technology with children to explore untold historical stories from the Second World War in an area of south London. They concluded that technology offered the children an opportunity to digitally augment the historical sites which fostered an emotional engagement with the historical material presented to children.

Digital mobile technology can be used to facilitate the reading of historical locations by accessing archival material when 'in place'. This form of 'digital storytelling' has been explored

in a number of studies to uncover the potential applications of it to develop historical knowledge and understanding. Robin (2006) has defined digital storytelling as the art of telling stories with a variety of embedded multimedia, such as images, audio, digital graphics, music and video, used to develop a theme or viewpoint. Projects such as Story Fountain (Mulholland, Collins & Zdrahal, 2004) have demonstrated the use of digital storytelling to engage students with cultural heritage collections in museums. Story Fountain was designed as application to be used on a mobile device where students enter their own open-ended, high-order questions as they interact with a corpus of digital stories involving code breaking at the Bletchley Park Museum in England during the Second World War (Mulholland, Collins & Zdrahal, 2004). The user is active in the construction of their historical learning as they engage with each story and ask their own personal questions to learn more about the historical context (Hein, 1995; Robin, 2006). A strong narrative should be provided to help users access the historical content with multimedia incorporated where possible (Nairsmith & Smith, 2006) to help users scaffold new representations along their story path.

Further recent research has been investigating the affordances of digital mobile technology to allow users to not only read historical locations but to also write their own stories as a form of meaning making with archival material in place (Paay et al, 2008; Procyk & Neudstaedter, 2014). Geo-storytelling is developing as a new form of digital narrative making being used by cultural heritage institutions to create ‘virtual heritage experiences’ (Refsland, Tutters & Cooley, 2007). Location-aware wireless technology offers an immersive experience where users can browse through layers of digital archival information geo-located to particular historical sites. Tutters (2004) has referred to this open-access spatial authoring system as ‘geograffiti’ (p. 80). This kind of virtual graffiti allows users to interact with layers of cultural

heritage material through locative media in a given place without physically authoring the location (Tuters, 2004; Refsland, Tuters & Cooley, 2007). Paay et al. (2008) developed a mobile location-based game which used the city of Aarlborg, in Denmark, as the physical setting for people to read and write their own stories using archival material from the Second World War. Paay et al. (2008) concluded that the geo-storytelling platform offered a physical tool where participants experienced stories with archival media as they created personal meaning from the evidence they gathered moving between locations. Users found the intersections between physical space and digital space engaging, enticing and motivating (Paay et al., 2008; Falk & Dierking, 2008).

Context of project

This project looked a design iteration in the development of a tool to enable users to tell digital spatial stories about cultural heritage locations using geolocated archival media. The tool, and accompanying curriculum, is being developed by the Space, Learning and Mobility lab (SLaM lab) at Peabody College as part of a project titled 'BLUES 2.0' which stands for Bridging Learning in Urban Extended Spaces. The SLaM lab aims to “engage faculty and graduate students in design studies of how physical and virtual spaces can better support learning. Members collaborate on research projects, design experimental teaching and write about relations between space, mobility, and learning.” (SLaM webpage, accessed on 8/20/2017).

Digital spatial story lines (DSSLs)

The BLUES 2.0 project is part of a National Science Foundation grant (#1623690) for “collaborative design studies to develop and refine learning networks and mobile applications

that bridge between curated collections (in museums and libraries) and public urban spaces using mobile digital technologies” (BLUES 2.0 grant proposal, 2016, p. 1). The current innovation a set of tools and practices that allow users to create and share “digital spatial story lines” (DSSLs) (Shapiro & Hall, 2016). These DSSLs use personal narrative to map archival media, such as those in museums or libraries, onto city neighborhoods at a walking or biking scale. “DSSLs are narrative index and media delivery structures that make vibrant aspects of past and present American Roots Music and Civil Rights activism available at a personal, embodied scale.” (BLUES 2.0 grant proposal, 2016, p. 1). Users create stories by curating a geo-located exhibition of archival and personal media to tell a story they find personally interesting and meaningful. This demonstrates the combination of the physical context within which the media is located, the sociocultural context of social interactions as a storyteller with an audience and the personal context of scaffolding learning by incorporating new media and experiences into existing representations (Hein, 1995; Falk & Dierking, 2008). Figure 1 presents a graphic which shows how scalable maps are combined with archival material using the affordances of digital mobile technology to produce a DSSL.

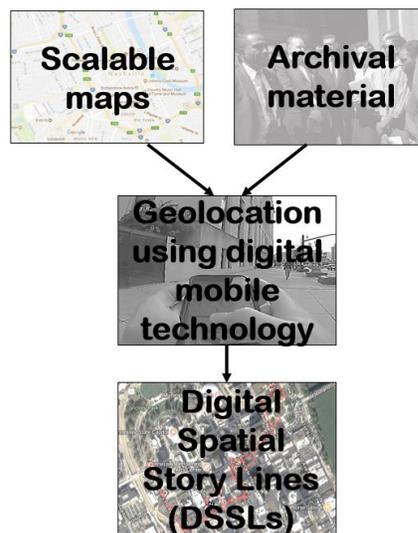


Figure 1. A visual representation of the process of constructing a DSSL as a combination of scalable maps and geo-located archival material mediated by the use of digital mobile technology.

The participants in this project used physical maps, photos, archival material from historical collections at public institutions and GPS software to construct a DSSL about American Roots music in a neighborhood just north of downtown or the American Civil Rights Movement in the center of the city (Shapiro & Hall, 2016). The process of curating the media and walking the story path represents the intersection of archival work, historical thinking (Wineburg, Martin & Monte-Sano, 2013) and digital mapping. Figure 2 below shows an example of a DSSL made with the app Live Trekker on the theme of American Civil Rights Movement. The path through the physical environment is shown by the red line. On the right-hand side are the archival materials and media captured in the field which have been geo-located to places on the map (represented by the numbered place markers).

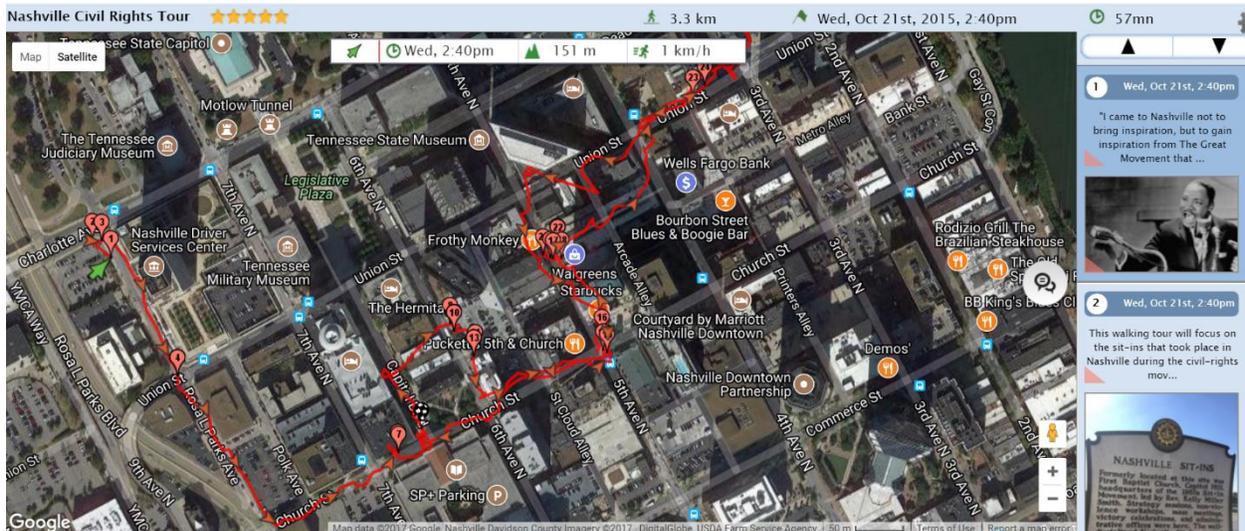


Figure 2. An example of a DSSL curated using the application LiveTrekker.

This project aims to highlight how the task of making a DSSL leads to learning about historical contexts. The findings section analyzes how users engaged with learning on the move using digital mobile technology to create meaning with cultural heritage material (Sakr, Jewit & Price, 2016; Shapiro & Hall, 2016; Taylor, 2017).

Method

Data was collected during a Human Geography class in the fall semester of 2015 at a private university located in the southern United States. The participants, seven pre-service social studies teachers, worked in two groups: group1 included Emma, Rachel and Scott, group 2 included Bethan, Inez, Nicole and Ken (all pseudonyms). Video data was collected during a sequence of 5 three-hour lessons using static cameras and Go Pro cameras placed on tables whilst students worked or worn by students as they moved around the city. The activities completed during the 5 lessons are shown in table.

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5
Listening session involving music from the Civil Rights movement	Research session in the Civil Rights collection at a downtown library using archival material to plan a digital spatial story line	Tour making – the 2 groups visited different locations in the city and used LiveTrekker to create their DSSL	Tour taking – the 2 groups visited the alternative location to take the tour made by the other group during the previous lesson	Post-task spatial storytelling activity Listening session led by students
Pre-task spatial storytelling activity				

Table 2. The lesson sequence.

Pre- and post-task storytelling

The data analysis examines the pre- and post-task stories the two groups created, marking the beginning and end of the DSSL making/taking lesson sequence. Students used the preselected resources to tell a story of a day in the life of a person who they picked out from one

of three black and white images from the 1960s. The images were archival photographs held in the special collection of a public library. No background information was provided to the participants as to the location or context of the images. The other resources included 4 newspaper front pages, taken from two different newspapers published on two different days during the 1960s and 2 different maps from 1960 and 2015 showing the same area of downtown. Additional materials available to participants included acetate to overlay onto the map to allow students to annotate locations and draw paths of movement. They could also use their phones and laptops to search for information on the internet. Video data was obtained from two video cameras, one mounted to capture each group, and 4 GoPro cameras, 2 placed in different positions on each table to capture activity and conversation on the tables. Figure 3 displays screen shots from the video data showing the resources provided during the task and participants sharing their geo-located story at the end of the task. All video data from the 5 sessions was been transcribed and the story text from the pre- and post-task stories is shown in the appendix in figures 9 and 10.

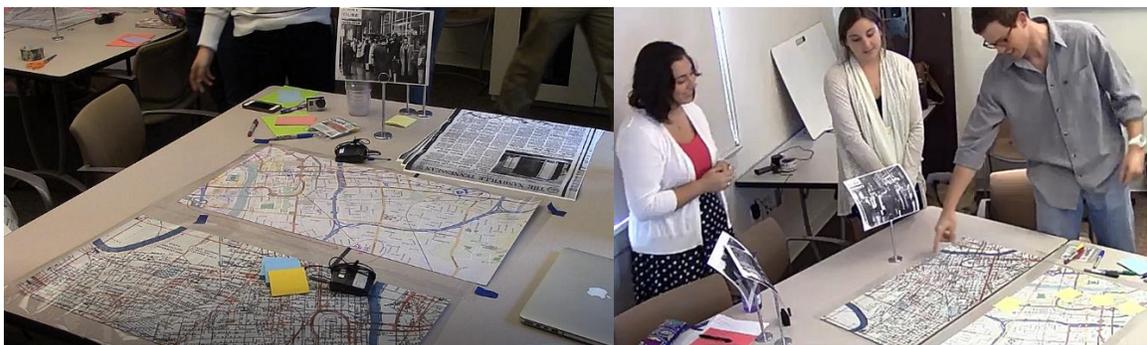


Figure 3. Images showing the resources provided to participants for the pre- and post-task storytelling task (left) and users engaging with these materials during their storytelling (right).

Findings and key themes

The pre- and post-task stories created by both groups were transcribed in full and then copies were edited to provide just the narrative elements of the story (i.e. pauses, repetitions and answers to questions from teachers were removed). Initial analysis of these story texts identified elements in the post-task stories which suggested that making and taking the DSSL tours had impacted on the participants' knowledge and understanding of historical contexts. Video footage from days 2, 3 and 4 (see table 2) was reviewed in parallel with transcripts of the pre- and post-task sessions to identify interactions where learning was being actively constructed as the participants worked with archival material and visited historical sites. Three themes emerged from looking at the story texts: a) historical contextual details from archival research were more evident in the post-task stories, b) locations from the DSSL tours featured prominently in the post-task narratives and c) participants made personal connections to the archival material during the tour construction which was then seen in the post-task stories.

Increase in spatial, contextual and temporal elements of post-task stories

A text-driven content analysis (Krippendorff, 2004) was completed on all of narratives. The story texts were coded for elements referring to people (who), action and events (what), location (where), time (when) and motivations or reasons for actions (why), terms referring to the common structure of journalistic storytelling (Craig, 2013). The coded story text shown in figure 11 in the appendix. Table 3 displays the number of references counted in pre- and post-text stories for both groups, along with the percentage change between stories.

	Group 1			Group 2		
	Pre-task story	Post-task story	% change	Pre-task story	Post-task story	% change
Who	5	6	17%	7	7	0%
What	8	10	20%	11	27	59%
Where	6	10	40%	10	12	17%
When	2	2	0%	2	4	50%
Why	2	2	0%	4	7	43%
Word count	284	303	6%	360	674	47%

Table 3. A table to display the number of references to people (who), action and events (what), location (where), time (when) and motivations or reasons for actions (why) in pre- and post-task stories by groups 1 and 2.

The most significant change from the story texts produced in group 1 was the increased number of locations they include in their post-task story (40%). Although their post-task story is not significantly longer, the references to locations, specifically those they visited in their tour making activity, suggest that they widened their spatial awareness and knowledge of historical sites in the city. For example, conversations during their post-task story development indicate that the participants became more confident in placing historical events at logical locations that fitted with the narrative they were telling, even though they might not be accurate. As one student, Rachel said to group 1,

“so even though we know, or we think we know, that it’s [the photo of students] at (university campus), what if we say it’s at Centennial park? There are trash cans and paths in the park too.” (Rachel, interview, 11/04/2015)

This comment indicated that Rachel was aware that she could take contextualizing details from the photograph and project the image onto a different historically viable location which her group could subsequently place on the mapped area. In other words, she used her developing spatial and historical understanding of student protests in the city to reasonably state that the image could relate to an alternative location. Group 2 showed a similar trend as the number of

locations mentioned in their post-task story increased by 17% and they expanded their post-task story to include locations beyond the area covered on the maps they were given. The increase in the number of locations mentioned in the pre- and post-tasks stories can be seen in graphs shown in figure 4.

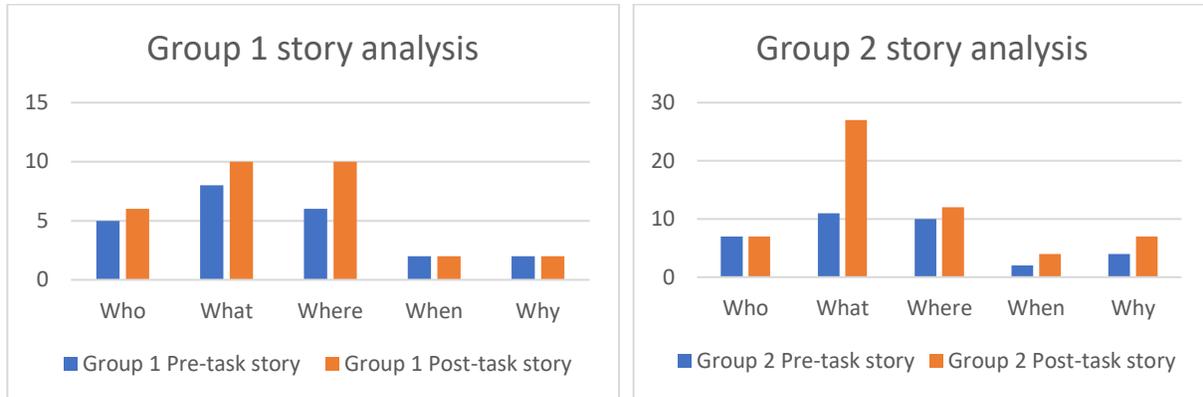


Figure 4. A graph to show the number of references to people, events, places, times and causes of action in the pre-and post-task stories made by groups 1 and 2.

In contrast to group 1, group 2 widened the geographic area in which their story was located to fit the narrative their narrative about an African-American student from a historically black college or university (HBCU) who travelled to the city to learn about non-violent sit-ins as a form of protest during the Civil Rights movement. The group used their electronic devices to search for an HBCU within a few hours drive from the city as they hypothesized their student character, James, could have attended. To incorporate this spatial detail into their mapped story line, they annotated the map indicating the direction James would have travelled by bus to reach the city and attend an event captured in the particular archival image. Figure 5 shows how the group annotated the physical map to show this spatial detail.



Figure 5. Screen shot of map annotations showing spatial details inferred beyond the map (indicated by arrows).

One key difference seen in group 2's post-task story was the length, showing a 47% increase in the number of words used compared to the pre-task story. Analysis of the 5 story concepts (who, what, where, when, why) indicated that the increase in story length was mainly due to the inclusion of more detail relating to historical events (what) and the motivations or reasons behind these actions and events (why) (see figure 4). An important finding is that many historical contextualizing details in the post-task story related directly to the research the group conducted at the library archives on day 2 and whilst visiting city locations during the construction of their DSSL on day 3. In the library, Bethan and Nicole found a map of the city marked 'Shoppers & Visitors' Map of Downtown Friendly [city]' which showed city locations in 1956 (see figure 6, left image). Nicole used her historical knowledge of 1956 to infer that "obviously [the city] in 1956 was segregated but they have not categorized these in to white restaurants and black restaurants which leads me to think that they are probably all white restaurants". The participants constructed meaning from their research in the archives as they actively mapped the information to the locations on the 1956 map (Hein, 1995; Falk, Moussouri

& Coulson, 1998) (see figure 6, center image). The group took a copy of the map into the city on day 3 during their DSSL tour making activity and used it to cross reference where they were today with what would have been at that location in 1956 as a form of active place-making (see figure 6, right image). The group returned to the map during their post-task story telling as Bethan tells Inez to “get the 1956 map out”. Inez replies “this is our map, we know it well!”. This exclamation demonstrates the familiarity the students have built up whilst interacting with archival material.

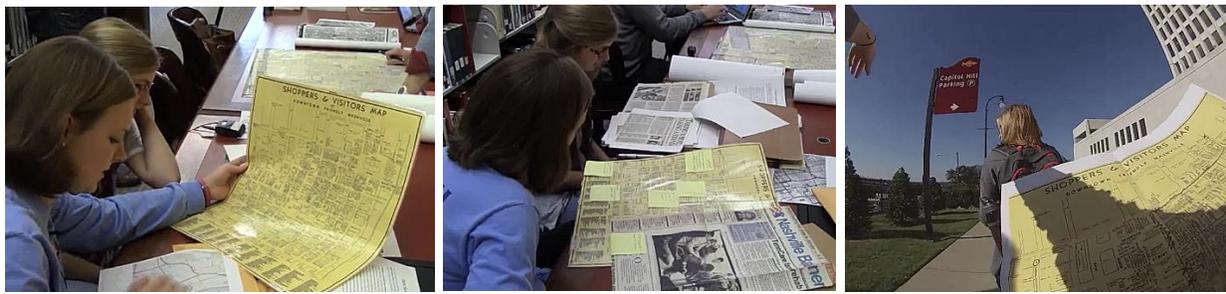


Figure 6. Students in the library archives researching a 1956 map of the ‘friendly’ downtown area (left); adding historical information from archival research to the 1956 map (center); using the map to navigate to the location of the First Baptist Church during their DSSL tour making (right).

Importance of tour locations in post-task stories

Locations visited during the DSSL making were essential components of the post-task narratives. Each group’s use of locations in the post-task narratives differed significantly from their use in the pre-task stories. In the pre-task story texts, both groups included locations which they were able to identify from details in the archival images. Group 1 chose an image of a student protest outside a downtown restaurant and used their existing knowledge of the city neighborhoods to imagine that the students travelled to the protest from their homes and university in a historically African-American neighborhood. Their story featured neighborhoods

and areas of the city rather than specific locations. Group 1 based their post-task story around the controversial construction of an interstate highway which was planned to cut through an area to the north of downtown. This neighborhood was the focus of the DSSL tour they made around the theme of American roots music. The post-task story text included more specific locations within the neighborhood such as a university campus, state capitol building and park.

Group 2 located their pre-task narrative at a department store in the image they chose. The street names were visible in the photograph which gave them a precise location. During the post-task, group 2 quickly decided that they are going to center their story around the sit-ins which occurred at downtown businesses during the early 1960s. This was also the focus of their DSSL tour. The post-task narrative featured 11 locations, 6 of which they visited during their tour making. The group were confident building their narrative around these locations as they had already researched them in the archives and visited the physical locations (Clabough et al. 2016). This is evident in the discussion as they located the Post House restaurant inside the Greyhound Bus Terminal on the map as the site of the student demonstration (see figure 7). The students used the ‘friendly downtown’ map from the archives at the public library. They chose to use this additional resource during the post-task indicating that they had taken a physical artifact and constructed historical knowledge and understanding from it (Hein, 1995; Falk & Dierking, 2008; Jakobsson & Davidsson, 2012).

Inez: How were we so easily able to establish that this was the Post House was in the Greyhound station?

Bethan: Because I found the same photo on the Nashville Public Library website when I googled 'Post House Nashville'.

Ken: Google's crazy.

Inez: But why like we couldn't figure that out. We tried so hard last time.

Bethan: I know I'm really confused.

Inez: But why? Was it this map that helped? (holds up friendly downtown Nashville map) Because we figured out that it was on here?

Bethan: I think that helped a little because we figured it could be an actual location that we could look up rather than just aimlessly googling.

Inez: Like 'Greyhound bus terminal 1960 something' (MN: mimes typing on a phone inputting search query)

Bethan: Also, I was trying to look up that map last night when I was working on the visual part of my paper so I already had that site in my head.



Figure 7. Transcript and screen shot of students using archival material to locate a restaurant associated with student sit-ins during the Civil Rights Movement.

Personal meaning making from archival material and locations

The process of curating locations for the DSSL tours involved interacting with archival material held in the special collections of the downtown public library. As both groups developed the narrative for their tours, they made a number of personal connections to the artifacts in the archives which they then incorporated into their post-task stories. This reflects the personal meaning making process described by Falk and Dierking (2008) as participants were motivated to learn more about the physical objects they were interacting with due to pre-existing representations in their sociocultural and personal contexts. The process of building knowledge into existing representations which is driven by prior interest is described more explicitly by Falk, Moussouri and Coulson (1998) as personal meaning mapping (PMM). PMM assumes that each individual brings varied prior experiences and knowledge into a learning situation and this shapes how that individual perceives and processes what he or she experiences (Falk, Moussouri

& Coulson, 1998). The combination of prior experience and the new experience result in learning, but the resulting learning is unique for each individual, situated within the context in which it was learned (Jeffery-Clay, 1998; Hein, 1995; Falk, Moussouri & Coulson, 1998).

PMM was evident in the interaction between Bethan and Nicole as they looked at front pages from newspapers published in 1960. They discussed going to both the white and the colored First Baptist Churches as part of their tour as these churches were significant locations associated with the Civil Rights movement. Bethan explained that her aunt and uncle are currently part of the congregation of the white First Baptist church and deduced that, since her uncle was born in 1965, she must have had family members who attended the church during the time period they were focusing on. Bethan suggested that she could get members of her family who attended the church during 1960 to meet them at the location when they visit to collect media for their DSSL. Whilst the group does not end up meeting with Bethan's family, the white and colored First Baptist churches feature prominently in their final tour (shown in figure 8).

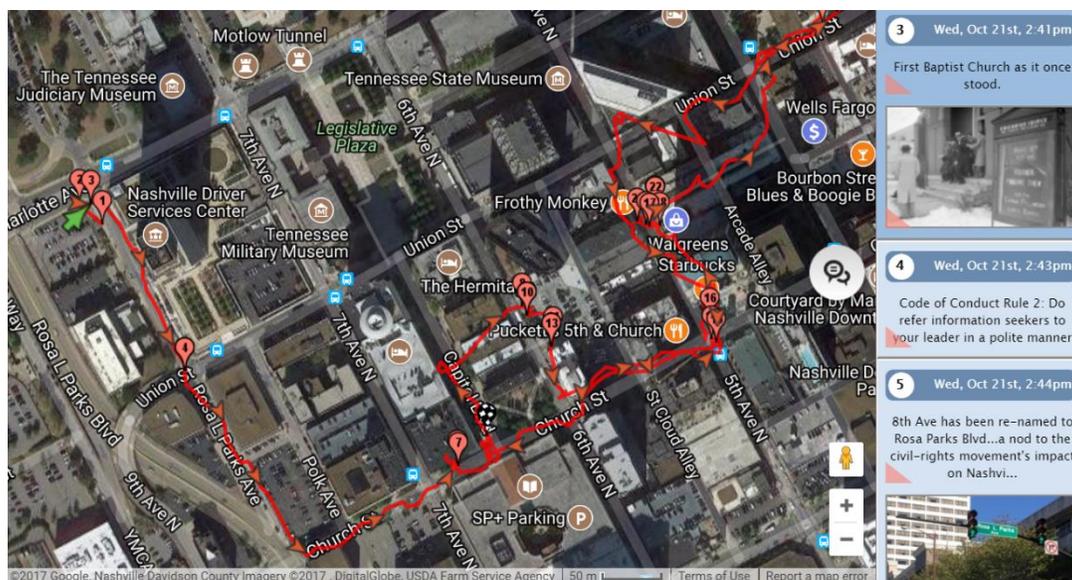


Figure 8. The DSSL constructed by group 2 on the theme of locations associated with the Civil Rights Movement. Point 3 shows the colored First Baptist Church.

The post-task story by group 2 highlighted the juxtaposition of their two central characters, the white store owner and the African-American student, who both visit their respective churches during the day they are describing. It is likely that the group's familiarity with these locations, stemming from their research and existing personal connections, led to them confidently including them in their narrative. Another example of PMM was seen in group 1 as they debated which of the 3 archival images to choose as the starting point for their story. They were drawn to a photo of white students petitioning members of the public which they think is located on their university campus because they recognized certain geographic features. Both Emma and Rachel mentioned that they have friends who participate in student demonstrations and petitions on campus and Rachel also said that students often have a 'rebel without a cause' mentality, meaning that they are likely to back a protest even if they do not have a personal connection to it. Group 1 leveraged their personal experience as students to infer the motivation of the students in the image, placing details of their own life experience directly into the narrative as mediated by the archival material (Falk, Moussouri & Coulson, 1998; Wertsch, 1991).

Implications, limitations and further considerations

The findings from this project are significant to the development of the tools and practices of place-making education using DSSLs in a number of ways. Mulholland and Collins (2002) have suggested 5 considerations when developing digital mobile technologies that use narrative to offer active, engaging learning experiences with cultural heritage material. These 5 considerations can be used to summarize the affordances of DSSLs as a set of activities and experiences for learning in the following ways:

- Active interpretation – DSSLs provide the user with a set of activities and experiences reading and writing digital narratives which incorporate media from different perspectives (Boland & Tenkasi, 1995; Taylor & Hall, 2013). This project has shown that users actively construct their narratives around artifacts, concepts and themes which they find personally relevant or interesting as a form of personal meaning mapping (Falk, Moussouri & Coulson, 1998)
- Representation of context – DSSLs allow the user to curate and view digital media in a way which is meaningful to them as they construct their own story or interpret the story authored by someone else (Hein, 1995; Jeffery-Clay, 1998).
- Representation of process – DSSLs allow the user to represent temporal, spatial and thematic connections between objects as they read or write the narrative which connects them. The DSSL presents a practice to mediate between the artifacts and user as it highlights the connections between the curated media (Wertsch, 1991; Jakobsson & Davidsson, 2012).
- Collecting as a creative and learning process – DSSLs provide a user-friendly interface to support the user in capturing, describing, locating and organizing objects in digital space (Refsland, Tutters & Cooley, 2007).
- Meeting the challenge to be entertaining and engaging – DSSLs can be used to set up interesting, broad and potentially controversial questions which motivate the user to explore cultural heritage material in new ways, particularly when the juxtaposition between objects, locations and narratives are revealed (Paay et al., 2008; Dijkers, Martin & Coulter, 2012).

Limitations

The data for this project involved a small sample (7 participants) who completed the DSSL making and taking activities as part of a university course. The students were used to undertaking activities in the classroom as directed by their course leader and were aware of the need to engage in these activities as they would be submitting a paper to be graded at the end of the 5 weeks. At least 2 of the students were very familiar with the historical context of the Civil Rights Movement in the city as they had completed previous university courses on the subject. They had significant background knowledge which they leveraged in their storytelling activities and these students were dominant voices within the group activities. Future iterations of the DSSL design and curriculum development in the future should include users with little or no knowledge of the historical context of the archival material in order to understand how they construct personal meaning when they have significantly fewer existing representations to scaffold their learning with (Hein, 1995; Vygotsky, 1978).

Another consideration is the locations and historical themes chosen for the DSSL making and taking activities which may have had an impact on the narratives the groups created in the post-task storytelling activity. Group 1 focused on a historically African-American area of the city associated with American Roots music during the 1950s and 1960s. Many of these historic music venues were demolished in 1968 due to the construction of the interstate. There are a series of historical markers in the neighborhood now but in order to see what the area would have looked like during the 1960s it is necessary to look at archival material. One issue group 1 encountered during their research in the library archives was the nature of the archival media relating to this area of the city. Of two main newspapers covering events in the city during the

1960s, one newspaper actively chose not to report on news from the neighborhood. This limited the amount of archival media available for the group to use in their tour construction. Group 2 had a considerable advantage in their narrative theme of the Civil Rights Movement as many of the downtown locations still exist and function as they did back in 1960. The city has also placed historic markers at sites related to churches, sit-in demonstrations, significant buildings and places related to key moments associated with the Civil Rights activism. Group 2 used many of these markers in their DSSL to confirm that they had found the correct location and they also included images of the markers in their tour (see figure 8). The public library archives also hold a considerable amount of media related to people, locations and events from the era. The richness of the archival material and locations within the city may have given group 2 significantly more historic contextualizing detail which they were able to leverage in their post-task story compared to group 1.

Future considerations

A consideration for future research is to ‘further develop partnerships, tools, and teaching activities that involve youth in bridging rich historical material held in museum and library archives onto the city neighborhoods these archives describe’ (BLUES 2.0 grant proposal, 2016, p. 1). The next planned iteration for the BLUES 2.0 project is to work with high school students who live in a neighborhood rich in history associated with American Roots music. The BLUES 2.0 project will construct sandboxes of archival material curated from the public library special collection and develop ‘spatial finding aids’ to consider how users can make connections between media. Working with students who have existing knowledge of the space but who may not be aware of cultural heritage of the area in which they live will offer an opportunity to look

at the affordances of the tools and practices of DSSLs to engage youth in storytelling with archival material. Further iterations of the design-based research for this project will involve designing more robust experimental teaching focused on making DSSLs where users can learn about public history, data curation, and digital mapping and analysis (BLUES 2.0 grant proposal, 2016).

Conclusion

This project has identified a number of potentially significant ways in which the DSSL tool and practices could offer a new means for people to engage with geo-located archival material in order to create personal meaning and learning. Data analysis suggested that the practice of creating DSSLs allowed participants to develop historical, spatial and temporal understanding of historical locations, form meaningful connections to historical locations and create personal meaning from archival material. The findings from this project are potentially significant to classroom educators who use archival material in their teaching as digital mobile technology and the practice of making DSSLs may offer a new teaching tool to engage students in learning about local history (Dijkers, Martin & Coulter, 2012; Dijkers, Mathews, Litts & Holden, 2012). The affordances of the process of DSSL making and taking activities would also be of interest to cultural heritage organizations, such as public libraries and museums, whose education mission is to engage visitors in learning through interactions with archival material. Facilitating meaning-making experiences with archival material through the use of digital mobile technology presents an exciting opportunity to look beyond the walls of museums by placing media into the locations and communities from which it originally came from. Connecting physical locations and artifacts to people's personal and sociocultural contexts, using digital

tools to mediate learning, appears to offer an engaging way to learn about the past by telling stories in the present which can be stored and shared in the future.

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Appendices

Group 1: Pre task story

We situated our narrative in the wake of the April 20th 1960 confrontation at the courthouse. A day later, there would be a sit in demonstration. The characters we picked were sunglasses man, young and hip, and the restaurant owner or the business owner who might have called the police and closed his business in response to the demonstration that's going on. We used the modern map because it was easier to figure out where everything was there. We tried at first to do like representing things on both but it never matched up.

We felt that this guy might be a college student maybe he was attending Fisk. We situated his house on Jefferson Street or off Jefferson Street. We thought that he might have walked down here with some of his buddies. We thought they might have been members of SNCC. I don't know if that's an anachronism but we thought in 1960 that might have been in existence and we thought that the business owner might have driven in from a part of town with might have traditionally been old money. We thought like out toward Belle Mead or Hillsboro. We had him coming in this way towards the restaurant which was down town and then this guy comes in from Jefferson Street. They intersect in the wake of the mayor's front news story.

The encounter of the demonstration with the mayor is at the courthouse and then we put a sticky note at the site of the demonstration. Then we had a little bit about the profile of the restaurant owner who we said probably commutes downtown and closed his restaurant because he was forced to by the sit in.

Group 1: Post task story

We went with the Jefferson Street story line this time and we were trying to situate where this might be. We originally thought that it was on Vanderbilt's campus but we were trying to be accurate and thought that might be the case but we realized that that's not on the map. We thought it looked like a park so we put them in Centennial Park, disseminating information on the steering committee's efforts to reroute the highway, or at least be more forthright with their plans and how they might want to move forward with their plans now that construction has already begun. We used the February 1967 newspaper that said that the highway had started to be built and it said that they were advocating for rerouting it or at least being more upfront. Because they were demanding the facts they probably had something which wasn't being said explicitly and probably weren't happy with how things were going.

That student started presumably in off-campus housing and he walked over to Centennial to meet his activist friends. He started passing out flyers and disseminating information about the lack of information that the city had about the whole construction of the highway. They also had a petition that they had people sign and then they brought the petition to the state capitol. That's our narrative for this guy's day. We thought that the newspaper was interesting but we were trying to stick to some discernable facts which we could figure out and this article says that protests happened at the terminus of the highway, like at 46th Avenue north. I don't think that this map actually goes that far but apparently that is a place where people on both sides who were supporting the highway's proposed route and against it gathered to fight it out.

Figure 9. Pre- and Post-task story text for group 1.

Group 2: Pre task story

We based our story off of this picture which is just a lot of people shopping and we figured out that it's at Church and 6th which is here so we mapped that. It's very close to where this rally was occurring that one of the newspaper articles was about. People were calling the mayor out for his failure to lead, was a phrase I think they used in sort of the civil rights era and saying that he believed that desegregation of restaurants and stores was morally correct but that he couldn't force that on store owners.

We chose the two little African American girls in the photograph and we picked a home for them and a reason they were downtown and thought that their parents had attended this speech at the courthouse and they stayed in the area and went shopping instead.

Then the other thing we noticed was that there's a white woman behind them who's carrying a Harvey's bag and we know that Harvey's at this time or approximately in this period would have had segregated lunch counters. We were hypothesizing that this black woman it looks like she is carrying a bag but we couldn't really tell because black and white photography is hard but we thought she was carrying some sort of shopping bag but it's not from Harvey's but this white woman is carrying a bag from Harvey's. So perhaps that's their experience if they see something in the window at Harvey's that they wanted but that they could not purchase that that's somewhat echoed what their parents were rallying for. We also hypothesized that their parents were wanting to attend this rally because they worked in this Jefferson Street area that would be highly affected by the highway. They lived over in this area because there's a school over there. We don't know if that school was segregated but in this case, it's the school that the girls went to and so the travel to and from school would really impact, or to and from work from their home, would impact the parents a lot so that's why it was important too.

Group 2: Post task story

We focused on this image and we were kind of intrigued by this guy towards the middle who's like smiling really big, he's looks really thrilled to be there. We thought that was really interesting. We decided to kind of explore his story. It came up in our research that the sit in movement in Nashville became sort of a national model that was used for other sit in movements because it was so organized, that was what made it all the more effective.

We envisioned this guy, his name is James, and James is taking part in a sit in movement in Nashville to learn about it and take it back to Atlanta which is where he lives because he's a student at Morehouse. Using the map well Atlanta is that way so we inferred that he might have taken a bus from Atlanta to his friends at Fisk, he's staying there at a house or whatever. We figured he probably connected with them through the student groups who were involved with the civil rights movement at the university because it was very interconnected. Maybe he was like the president of the chapter or something.

His day starts out at somewhere near Fisk, a home, house, apartment, something, he likely took the bus to the First Baptist Church which was on our tour because we knew that the church was a key location for the sit in movement and the organization of the sit in movement. They probably met there and to sing some songs, organize, have breakfast, maybe go over protocol and things to do because they were about to go on this [demonstration. Then after that probably walked to this restaurant which was located over here near the Greyhound bus station and had this protest, demonstration.

We googled Post House so that was our best guess and I found the same picture in the Nashville Public Library digital database and the caption associated with it said that the restaurant was inside the Greyhound bus station which we found to be really interesting since that's definitely a big hub. That's like a really important place in the city with people coming and going.

We figured they were demonstrating out there and you see the manager in the top right window, he doesn't look very happy with the situation so we figured he called the cops and asked them to disperse the crowd. They refused to leave and they got arrested. We didn't think that there would be some sort of like physical escalation because you could have gotten arrested without that having to happen and like one of the rules of conduct was not to do that so I think they probably avoided that and then we have him get arrested and then go to jail and that's where he spent the rest of the evening. Probably sang some more songs. He might have written down like reflections, like what he might have learned, like what had happened. Perhaps called a friend. If they let him make calls he probably called people at Morehouse about the situation.

So then we thought about the juxtaposition between this guy James' day to what we have inferred like the manager, store owner, shop guy, who probably lived like away from the city, owned a home, probably drove into work, had the whole day go down, called the cops etcetera probably walked over to the white First Baptist church that was right by the work and then probably drove and he ended his day at home instead of in prison.

We were thinking that maybe he had choir practice or something so that brought him to the church after work. We thought it was an interesting juxtaposition that they both spent parts of their days at the different churches but for very different reasons because that is pretty likely circumstance. And the songs, since we've learned were integral in the civil rights movement but the purpose of singing in churches was way different white versus black.

Figure 10. Pre- and Post-task story text for group 2.

