

Drumball: Digital drum talk as a medium to promote multimodal literacy
and socio-emotional development of children

By

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Abstract

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Recently, research efforts to close the achievement gap have highlighted the importance of understanding children's experiences in the early years, how they come to learn about literacy practices and about their identities and positions in the world, in order to identify and address the challenges they soon may be facing. As the educational community continues to seek effective approaches to pedagogy and curriculum that will curtail the trend of a widening literacy gap in the future, researchers and practitioners look to the careful study of small-scale interventions in their target settings as a viable path for improving teaching and learning practices through the refined articulation of principles and processes that underpin their activity. Through that understanding, the design of learning ecologies can be approached by leveraging the potential in those elements of interventions that show promise in increasing the individual achievement and social participation of children, especially those most underserved by the prevalent cultural approach to learning in our schools. Using cultural historical activity theory as a lens, this design-based study instituted an *Urban Griots Playground* intervention and a researcher developed *Drumball-Alphariddims* digital platform as an embodied rhythmic-based learning system to stimulate children's literacy development and multimodal meaning production through joint child-parent activity. Qualitative data on five 3 – 6 year-old participants and their parents were collected in the form of pre- and post-tests, interviews, surveys, observations, audio/video recordings, and focus group discussions. Key findings from this study were that the intervention model encouraged the children's exploration of literacy behaviors through embodied learning, fostering emotional understanding and key social participation dispositions, while providing parents' with tools for evaluation and positioning them as social partners and enablers of their child's learning. The significance of this study is that it provides children, parents and educators with a culturally-grounded approach to early literacy experiences that combines rhythmic communication with new tangible and wearable media technologies.

*By the example of the old rope,
weave the new.*
(Ewe drum proverb)

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DEDICATION



To all my relations – past, present and future

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To the African Diaspora community across the globe, this one is for you!

Prelude



2019 UC Berkeley Grad Slam 3-min Talk

Before the Internet. Before Television and Radio. Before the telephone and before the telegraph. There were talking drums. *Talking* drums. The world's first wireless communication technology used to transmit information at a distance in a rhythmic form called drum language.

Relayed from village to village, drum messages could travel a hundred miles or more in a matter of an hour, with children almost always being among the first to pick up on their meaning, perhaps by virtue of the musical nature of drum communications. In fact, drum language was so widespread in some parts of pre-colonial Africa that it used to be like a second form of language used for a variety of communicative purposes. And with everyone having a drum name, including even pets at times, this was a powerful and significant mode of socialization.

Might sound irrelevant today when you can text yourself across the world in a matter of seconds, but in the days of foot or horseback messengers, talking drums were quite the innovation.

Fast forward to today, to our society of information and communication technologies (ICTs - desktop/laptop computers, tablets, mobile phones, AR/VR etc.) and embodied interaction, talking drums may strike us as all but an archaic and obsolete technology when it comes to communication.

But in light of recent advances in human-computer interaction (or HCI), the talking drum may yet still get a chance to defy this threat of obsolescence posed by new ICTs and reinvent itself, once again.

This is the focus of the Drumball research on embodied learning environments that act as contexts for multimodal literacy practice. In short, this is a dissertation on the redesign and application of talking drums to investigate the impact a digital drum talk mode can have on the literacy skills of children. With the *Drumball*, we could transform early childhood education. By accelerating research on culturally-grounded embodied learning environments which blend rhythmic movement and computer interaction, allowing drum patterns to be turned into and used as letters, words and phrases we could mediate learning across a wide variety of subjects: reading, geography, drama, history, technology. All through the inspiration of the talking drum.

Chapter One – Introduction

The (Untold) Hero of Wakanda

The blockbuster movie *Black Panther* (2018) described a vision of the technologically advanced African fictional nation of Wakanda. It's a vision in which a Black nation is represented in the media as a bastion of indomitable will, strength and intelligence directed toward maintaining sovereignty in the face of oppressive forces attempting to gain control over the source of its formidable technology – the rare metal vibranium. T'Challa, first son of Wakanda's king and protector T'Chaka, was taught the properties of vibranium when he was a child, and his lessons in royal duty began at age five. Thrust into power prematurely after the death of his father at the hands of an international plot at the United Nations (as depicted in the 2016 film *Captain America: Civil War*), T'Challa ascended to the throne and took up his father's mantle as the Black Panther. King T'Challa's younger sister, 16-year old Shuri, is the mastermind behind Wakanda's most cutting-edge inventions that keep the country in the lead, such as the Black Panther's sound-absorbing "sneakers" or the retractable body armor suit which can spring onto his body from the spikes of his necklace.

While *Black Panther* is neither the first predominantly Black film nor the first Black superhero film, the film's release was a landmark event across the African diasporic communities as families and schools from Oakland, CA to Accra, Ghana, turned a movie premiere into an all-out global cultural phenomenon. Beyond the plethora of commercial products (memorabilia, costumes, video games, toys etc.) that routinely follow such blockbuster Hollywood releases, *Black Panther* spurred deeper conversations in educational settings around questions of multiculturalism and multilingualism, racial inequality and discrimination, slavery and colonialism, and gender or representation in STEM fields. The film "challenges notions of the value and possibility of non-white, non-male-focused storytelling" (Berliner, 2018, ¶ 3).

Aside from the cast of human protagonists in the *Black Panther*, there is a hidden star of the film. The music that pairs with T'Challa appearances (whose character is played by Chadwick Boseman who died from cancer on August 28, 2020), is led by the "talking drum," a musical instrument and wireless communication technology used to send complex and widely understood messages back and forth between different places, and even over long distances by relay. In the film, the solo talking drum (performed by Massamba Diop, a Senegalese musician and master of the *tama* who has worked with Afro-pop superstar Baaba Maal) would speak T'Challa's name on the drum whenever he's on screen.

In its communicative use, the talking drum builds on the concept of the drum as an extension of the mouth, mimicking the prosody of speech in a specially styled form on the drum – a form that has been used and transmitted unchanged from ancestral times to the present as a traditional cultural system. The nature of drum language in its mechanics is that it imitates the spoken language and makes extensive use of metaphors to convey specific meanings and represent names for persons, objects and places. This drum-oral connection has long been documented in the literature of cultural anthropology and provides the basis for how oral strategies used for gathering, storing, retrieving and communicating knowledge have been *digitized* (as related to the fingers) on the drum. As a linguistic mode of communication, drum language thus relies extensively on the use of spoken utterances played on the drums and fulfills many of the mnemonic, social and transmissive functions of writing, although operating on the *aural* instead of the *visual* plane. Given that the representation of drum messages consists of

sequences of distinct drum sounds perceived as signs (e.g. tone, slap and base on the djembe drum) which are in precise rhythmic relationships and ultimately define a set. As Finnegan (1970) noted, “this type of medium can also be used for specifically literary forms, for proverbs, panegyric, historical poems, dirges, and in some cultures practically any kind of poetry” (470). As it turns out, the talking drum, and by extension drum language, is a medium that can be used to address a wide range of social uses and educational purposes. Some have laid out a useful way of thinking about the *drummed word* as a powerful agentive force from the perspective of African pedagogy, psychology and communication. Clotney (2003), for example, noted that “in ancient times, messages were sent from village to village by drum...and always it seems that the children are the first to hear this message” (86).

Extending Talking Drums into Contemporary Early Childhood Education

By way of introduction, perhaps I can say why I think it is of interest and importance to consider drum communication as a context for developing children’s early literacy skills. The theoretical perspective that informs this dissertation is that drum language can be viewed as an authentic cultural system of communication and that drum communications are *speech acts* performed in accordance with the model of communication most linguists use for analyzing the functions of language – in terms of message, addresser, addressee, shared context, contact and common code (Jakobson, 1960). This is evidenced by the fact that in a typical context of use involving a speaker, a drummer and an audience of hearers, the drummer will rhythmically reproduce the many prosodic and syllabic features of the speaker’s utterance in a characteristic way on the drum that other members of the language group can understand, thus amplifying the words spoken, although in a different, drummed form. These drum messages are not static repositories of formulaic meaning rhythmically invoked, but are produced in particular social contexts of interaction between historical actors with specific intentions and resources. So, in seeing drum communications as a form of discourse, I refer to what Searle (1971) wrote concerning the meaning of “speech acts,” in that they are “characteristically performed in the utterance of sounds or the making of marks. What is the difference between *just* uttering sounds or making marks and performing a speech act? One difference is that the sounds or marks one makes in the performance of a speech act are characteristically said to *have meaning*, and a second related difference is that one is characteristically said to *mean something* by those sounds or marks” (188).

Communicating meaning via drum language as an activity relates to the goals of schooling in that, like reading from textbooks, both activities create a shared context of production and interpretation as well as “provide efficient means of controlling access to symbolic capital and evaluating the discursive competence of individuals” (Briggs & Bauman 1992:161). In general, U.S. educators lack a unified pedagogy of what orality and its related process of drum language communication can contribute towards children’s motivation to develop literacy skills early, and thereby positively influence their later achievement and success. This persisting lack of awareness of the affordances of drum language as a mode for communicating and expressing meaning (or storing and retrieving information) represents several lost opportunities for the educational community to benefit from the perspective of a system of knowledge production and transmission grounded in a non-Western cultural system. Motivated by concerns of a growing literacy divide in the future, this dissertation research addresses a need for parents and educators to get creative in developing new ways to getting all children excited about acquiring literacy skills early, especially those most disadvantaged, underserved and marginalized by contemporary approaches to schooling in the US.

Urban education research has a long-standing focus on achievement. From the perspective of marginalized students, achievement is often affected by the access to educational opportunities that either validate or celebrate their cultural sense of identity. In a teacher's practice, this often means a demonstration of how the curricular strategies and tools increase or contribute to students' identity formation. Cultural historical activity theory (CHAT) has been employed by scholar-practitioners across a diverse array of fields to advance ways of thinking about and shaping professional practices such as developing curricula regarding teaching at all education levels (language, language learning and literacy, in particular) and designing digital technologies, among many others (Cole, 1996; Jonassen & Rohrer-Murphy, 1999; Roth & Lee, 2007). As a foundational framework, CHAT provides a broad theoretical approach (in which there are many variations) to understand how people interact in their environment through the use of tools and through the activities that are associated and mediated by those tools (Engestrom, 1999). Language, language learning, and literacy find a proper place within CHAT when the latter is allied with speech act theory. This integration is made possible because of the central role actions (acts) play in both theories. A speech act has productive, intentional, and outcome components (Austin, 1962); as such, the speech act constitutes a legitimate form of action according to CHAT (Leont'ev, 1971). Meanwhile, at its core, activity theory casts the relationship between people and tools (technology) as one of *mediation*; tools mediate between people and the world. In activity theory, technologies are both designed and used in the context of people with intentions and desires. People act as *subjects* in the world, constructing and instantiating their intentions and desires as *objects* (Kaptelinin and Nardi, 2006). According to Koszalka & Wu (2005), "as educational technology has become more prevalent in educational settings, research efforts have increased to study technology's uses and impacts" employing activity theory as a "socio-cultural and historical lens through which human activity systems can be holistically analyzed" (492).

This dissertation is grounded in a CHAT-inspired framework for observing the complex dynamics of young children's development of early literacy behaviors (like use of the alphabet and print awareness) when engaging with multimodal, call-and-response, embodied learning tools (for example, rhythm-mediated technologies like the drum, or digital variations thereof). From this perspective, the analytic focus of this dissertation is on the activity system whose main object is the development of children's literacy and socio-emotional potential within a community of diverse actors (parents, teachers, extended family, schools, districts, companies, community mentors etc.) using various means/tools (symbol systems, texts, writing/digital tools etc.) and that is governed by a set of specific rules (national standards, for example) and a particular division of labor. It needs to take into account multiple modes of literacy, languages and hybridizations extending from the very local, to the regional and nationwide cultural and historical contexts, as "cultural conditions in each nation are such that we need to dig into the history in order to come up with viable solutions and uncover historical contradictions and possibilities, given the context" (Lemos, Pereira and Almeida, 2013:719). Whereas their counterparts in Africa are often able to leverage their inherent cultural motivation and competence in drum language as part of their formative learning experiences (Coe, 2005), educators and parents in the United States remain by and large unaware of this speech mode of drumming as a method of communication, probably due to the fact that drums were banned in this country during slavery. The reason drums were banned in some instances in early America was precisely because the drum was understood to be an instrument of communication, after the drum came into use during the 1739 Stono Rebellion in South Carolina. After this revolt the

slave-owners realized that the drums could talk, and passed a law which banned the enslaved Africans from having and playing drums. Starting on the plantations of the Carolinas and Georgia, this ban soon spread nearly everywhere (Zhao, 2018).

This historical fact that drums were banned in the United States is worth noting here as little attention so far has been paid to how pedagogical strategies and cultural tools based on cultural systems of non-European or non-European-American ethnic groups (like drum language) can be used to transform the learning ecology and experience of at-risk children, and thereby positively affect their school achievement (Lee, 2001). This raises important practical, theoretical and policy issues regarding early literacy and language learning in 21st century homes and schools, and the kinds of instrumental changes needed to curtail this problem in a way that does not further exacerbate these dynamics, and ideally work to reverse them. Especially as “cultural style research has helped the field think of differences rather than deficits, by characterizing cultural ways of different groups in terms that are respectful, attempting to describe them without making value judgments that suggest value hierarchies in cultural practices” (Gutierrez, Rogoff, 2003:19). Consequently, the present challenge for the next generation of parents and educators to ensure that our most marginalized children acquire literacy proficiency in the early years thus hinges heavily on the design of culturally grounded, learning environments that provide meaningful experiences and modes of literacy practice to stimulate their cognitive as well as socio-emotional development, in light of this historical context.

For this reason, drum language presents tangible affordances and opportunities for transforming the pedagogical strategies aimed to support early literacy, language and socioemotional development. The focus of my dissertation work has been to investigate how the combination of drum language cultural systems with the power of computational media as a mode of communication, expression and multimodal meaning production, would impact children’s literacy and social-emotional learning, and spur the design of new technologies for creativity and learning. This research is based on the idea that we can find potentials and possibilities by creating new challenges and new settings in which children can step to the next level or zone of proximal development of multimodal literacy. Children’s learning from this socio-cultural-historical perspective can be seen as participation on three planes (Rogoff, 1993:8):

- Apprenticeship (the community plane),
- Guided participation (the interpersonal plane),
- Participatory appropriation (the personal plane)

In light of this, my overarching research goal has been to understand what affordances drum language communication practices, seen as part of the broader early childhood education activity system would contribute to children’s multimodal literacy and socioemotional skills, and how such an integration could inform homeschooling and out-of-school embodied learning curricula and tools. For that, I had to design an intervention. This is intervention research aimed at the articulation of a theory for praxis and participatory action design research principles. Such a framing involved parents as partners in making drum language practice available as part of the oral/aural, visual and embodied learning experiences children have access to, whether at-home, out-of-school or in the classroom.

Prompted by this challenge to imagine new contexts and digital tools that can facilitate

the inclusion of the cultural resources and embodied skills learners bring with them to literacy practices (such as storytelling, singing, playing music, dancing etc.), the *Drumball* was designed as a “device that allows rhythmic input to be turned into and used as letters, words and phrases” (Tchetgen, 2017:1) to better understand children’s acquisition of literacy and socioemotional skills when engaged with the embodied modes of communication such trans-African cultural practices provide. More narrowly, the *Drumball-Alphariddims* tool was introduced as a drum language-based communication system within the context of a family workshop (the *Urban Griots Playground*) that functioned as a community of practice centered on voice, rhythm and movement activities that stimulate the multimodal literacy and socioemotional development of children through singing, drumming, call-and-response, dancing and role-play. As such, this intervention provided an ecology of conceptual and material tools of multimodal production, as well as embodied learning activities through which parents and children could pursue the realization of their desired object-outcome of early literacy practice (alphabet knowledge, vocabulary) and socioemotional skills via their interactions with the community and environment of the workshop.

While rhythm-based and movement-linked pedagogical activities and games have been known to play a supportive role in children's early learning experiences – for example, with the use of clapping, music or the use of body movement for developing the phonemic awareness and aural intelligence needed for literacy development (Education Service Center Region 13, 2017; Karzin, 2015; Cole and Boykin, 2008:333) – few educational interventions have embraced the potential of drum language as a culturally-grounded communication system for language and literacy learning. As one graduate student writes in reference to *Black Panther’s* impact on various social media platforms, gaining the attention of parents, teachers and school leaders alike: “when school systems make a choice to adopt culturally responsive pedagogy, it reminds every student that they matter. That pride in their identity is not a threat, but rather a necessity. A necessity that can foster their academic achievement, social responsibility, and prepare them for the society that lies ahead of them” (Kobbah, 2018, ¶ 6).

Rhythmic Communication: Re-coding Drum Language

Orality has received some attention in literacy studies (Finnegan, 1970; Ong, 1977). Yet, little attention has thus far been given to the drum-oral mode employed by talking drums, and its relationship to the development of new media literacies. Speech was sound before it became script. Over centuries, Africans developed the most sophisticated system of acoustic speech surrogacy with the principle of talking drums. Script, print and electronic text are also speech surrogates, although visual. Whereas, from the written word through the technologies of the pen, and alphabetic writing particularly, one can represent the phonemic elements of speech in a visual form and transmit information, in Africa, there have been other, more aural kinds of speech surrogates, including the drum, horn or flute, and their peculiar methods of phonemic and lexical representation. As such, this research repositions the drum and drum language as paradigmatic tools of orality, in the same way that the pen is a paradigmatic tool of literacy.

The orality question from its inception in the literacy studies literature has been firmly defined in opposition to textuality as extremes on a cultural spectrum of choice of transmission mode. While writing (with its sequential and visible aspects which render it durable from a temporal perspective) is often considered the primary mode of representation of text, this

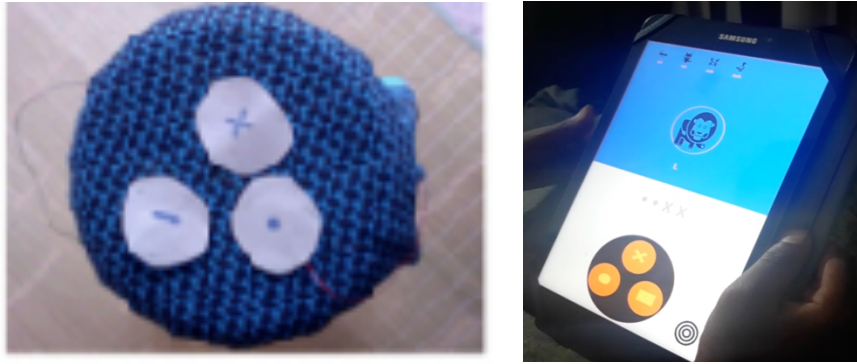
research challenges such a definition, since in fact “communication, whatever the mode, always happens as text” (Kress, 2003:47). This includes drum language communications (Carrington, 1949; Nketia, 1968; Finnegan, 1970), which although ephemeral and invisible, fulfill many of the functions of writing (Jahn, 1961). Some of the shared cognitive functions between drum language and writing include: mnemonic, communicative and poetic, albeit the ephemeral and invisible aspects of the drum language mode of transmission impose certain transmission challenges compared to writing (such as the co-presence of parties in an exchange, although a digital medium can help to circumvent this). However, drum language offers a kinetic function that is lacking in the written mode. Writing (much like modern typing today) are fundamentally rhythmic events, except they do not make conscious use of this rhythmic dimension to inform the meaning or structure of the interaction or communication. This research thus proposes a recoding of drum language by transducing ephemeral and invisible rhythmic events into sequential and visible multimodal objects (images, sound, text) with the goal of digitally augmenting rhythmic communication in order to stimulate children’s multimodal literacies (including reading and writing).

Designing a Culturally-Grounded Embodied Learning Environment and Theory

This dissertation focus has important theoretical and practical implications regarding the issue of literacy in the 21st century, namely: the kinds of learning modes available to students whose cultural achievements have been historically misrepresented and/or suppressed in the curriculum, and the kind of ecological transformations and technological innovations needed to curtail the achievement gap in ways that do not further exacerbate these issues, and ideally work to reverse them. To explore this central purpose of the research, I designed the *Drumball* as an example of an embodied learning environment that could be integrated into homes, classrooms as well as out-of-school creative cultural arts spaces, and conducted a design-based study with children and their parents as participants using it through a series of four sequential family workshops culminating in a final performance.

The *Drumball* (Figure 1) is a digital orality hypermedia system and haptic system that acts as a transducer of finger-tap and hand-stroke patterns into digital audiovisual output. Transduction is a process in which something which has been configured or shaped in one or more modes is *reconfigured*, *reshaped* according to the affordances of a quite different mode. A hypermedia system is a multimedia system in which related items of information are connected and can be presented together. Haptic systems expand the affordances of physical objects, surfaces, and spaces so they can support direct engagement with the digital world through touch. As an interface to the computer, it can also facilitate the integration of a different kind of communication system in-school and out-of-school that is consistent with other cultural systems situated within learning settings that can have powerful cultural and communicative implications and applications (e.g., African Drum and Dance, Drum Circles, Music and Movement, Afro-Brazilian Martial Dance).

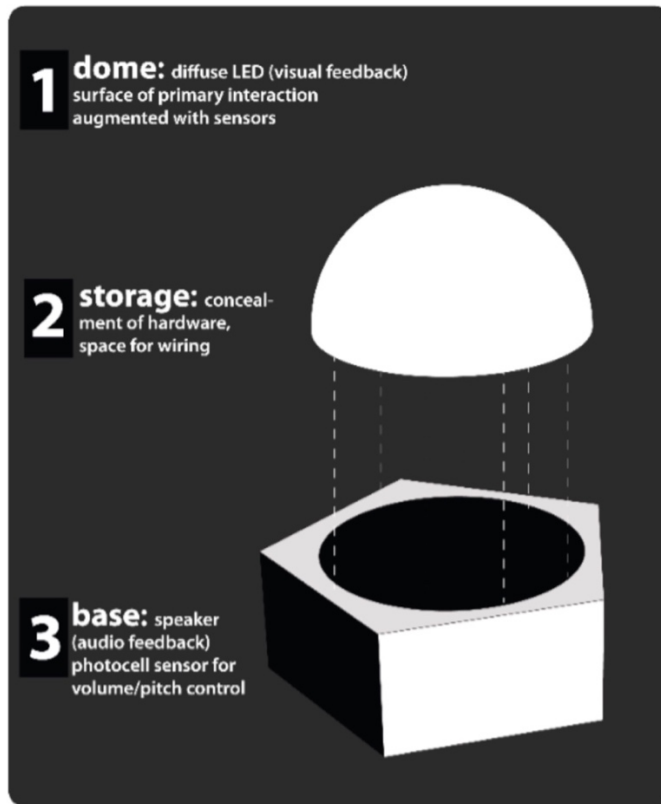
Figure 1: - *Drumball* haptic interface and *Alphariddims* mobile app



The *Drumball* apparatus is a hybrid device for composition and method for transducing rhythm to/from text to facilitate communication and self-expression (patent pending). Original prototype (left) made of custom fabric with conductive pads as input sensors connected to a laptop. The tablet version shown on the right combines the interactive surface as part of the display window of the *Alphariddims* app. *Alphariddims* is a rhythm-based alphabet learning game that lets users transduce patterns into letters to spell words using a Morse code-like system of 3 signs (· – x; tone, slap and base). By associating the concept of drumming to the action of producing a letter, this activity connects music with literacy and numeracy as each letter is generated from a rhythm of exactly 4 beat combinations.

The *Drumball* invention is directed to a novel method for language learning and mode of communication by means of an embodied learning device for detecting and converting hand-played rhythmic patterns into multimodal information (sound, images, speech or text). The invention explores a novel design for percussive interfaces incorporating rhythm-to- text transduction (Morse code), audio input/output and graphical feedback in a device used to support face-to-face oral and rhythmic collaboration for musical and textual communication. It enables users to communicate, learn basic hand- drumming and share various forms of narrative expression with others via asynchronous and real-time exchange. The general system is conceptualized as a surface-agnostic sensory input model capable of recognizing hand-drumming pattern-signals and converting this rhythm sequence into tonal, textual or graphical output, in a web-aware fashion. The system concept is illustrated as an example in Figure 2 below depicting an exploded mock-up view of the components that may comprise the tangible user interface device (the “device”) having a dome or percussive surface of primary interaction augmented with 3 sensors (or more), attached to a storage enclosure housing a hardware layer consisting of wires connecting each input sensor to a programmable microcontroller that detects presence of touch data and sends them for processing to a web script running on a remote server accessible on a host device (desktop laptop, tablet or mobile phone) via wireless communication.

Figure 2 - *Drumball* system concept (main components)



In alternative embodiments, the percussive surface may be designed in such a way that a user might sit on the device in order to operate it (such as a *cajon* or *yoga ball* as depicted in Figure 3).

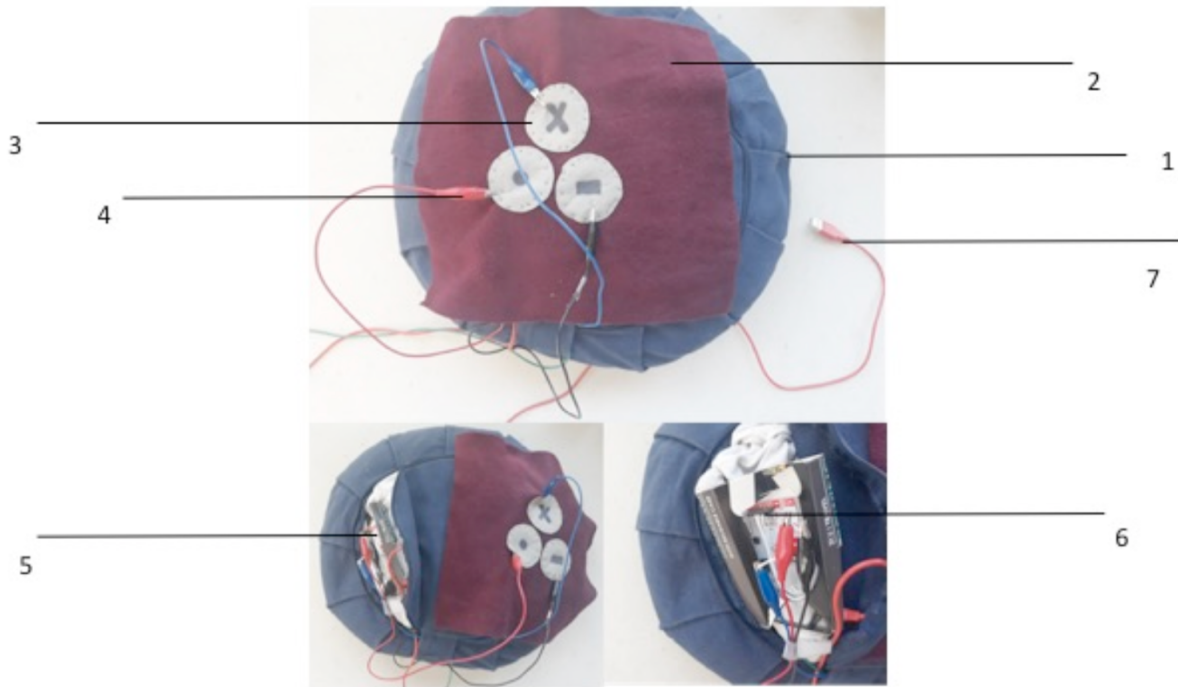
Figure 3 - Drumball ideation sketch (future embodiments)



Based on this dissertation's exploratory study results, which showed that the children of this age group had more facility with the mode of interaction right from their body versus using the drum or device, another possibility yet could involve a set of wearable sensors that can be mounted at various parts on the body, thus allowing for a fully embodied experience, without any peripheral device. Innovative projects like DrumPants.com provide encouraging and inspiring directions.

The actual prototype designed for this dissertation was made of custom fabric with conductive pads overlaid over an actual object or instrument (as in the *djembe* drum cover prototype depicted earlier), thus providing presence of touch information of a user's hand. It is intended to serve as a rhythm-based multimodal call-and-response platform and language learning tool. The cushion prototype version below in Figure 4 gives a bird's eye view of the main components which make up the device.

Figure 4 - *Drumball* prototype (current embodiment)



1. Cushion
2. Felt cover
3. Drum pads made of conductive fabric
4. Alligator clips
5. Housing case
6. Makey Makey circuit board
7. USB cord

The intent of the dissertation was therefore to understand how the *Drumball* prototype, as an exemplar of culturally-grounded embodied learning environments, provides a research context for developing the theory of digital orality (DOT). As a learning theory, DOT takes its cue from the practices of cultural settings like African drum and dance ensembles (or Capoeira), to leverage the human, symbolic, social and technological factors that facilitate meaning-making and social participation, and then see what the application of those principles in a home or school setting would look like for children who might naturally acquire information, knowledge, understanding, views of the world in trans-African settings. The implication is that the integration of drumming and drum language practices in early literacy experiences using multimodal haptic technology that is culturally-grounded in its design and participation framework could facilitate the inclusion of children's evolving cultural repertoires in schools to provide new gains for such children in oral, literacy and verbomotor skills as they learn.

Prior to conducting the dissertation study, a preliminary phase of activities was conducted in community-based, dance and cultural centers and involving community members (parents,

children, teachers, drummers and designers) in the fine-tuning of the design (curriculum and tools) to be used as part of the actual dissertation study that consisted of a 4-part series of workshops employing this design with the focal children and parents. I investigated the ways that a culturally-grounded embodied learning environment would impact the nature and outcomes of focal children's multimodal expression and social participation. From this basis, the focus of the actual intervention was to understand the impact and affordances of the communicative (linguistic), musical (rhythmic) and embodied (performative) aspects of this approach on children's literacy behaviors and socio-emotional development by observing and documenting their participation, interactions, and actions during sessions via audio and video. The study data was analyzed and interpreted not solely to determine the efficacy of the intervention on children's literacy behaviors and socio-emotional skills development, but involved all three planes at the same time (community, interpersonal and personal), in order to: investigate the activities that the community engaged in at the workshop, explore the interaction of the children with others (at-home and during the workshop), and to understand how children transformed their own learning by participating with others. In this way, the relationship between educational theory, designed artifact and praxis can be ascertained.

Looking to the *Urban Griot Playground* workshop as a model setting for future interventions, the study sought to understand the role culturally-grounded embodied learning environments (like the *Drumball* and *Alphariddims*) play in children's literacy and social-emotional skills development, as well as develop teaching and learning strategies that parents and instructors can easily adopt at home, school or in the community. Recognizing the deep connection between social-emotional development and literacy in children's early successes or failures in school, the goal of this dissertation was to explore a design of multimodal interactive environments and experiences grounded in trans-African cultural systems (and tools) that had the objective of increasing children's literacy and social-emotional development in the early years. The settings for the study were out-of-school community-based cultural settings, and the research examined the following central research questions:

1. What are the impacts of culturally-grounded, embodied learning environments and activities using the *Drumball* and *Alphariddims* mediated in the *Urban Griots Playground* approach to multimodal experiences on children's literacy development particularly in the area of aural/visual literacy skills related to letter naming and word spelling?
2. What are the impact of the same approach on children's socioemotional development?
3. Finally, what are potential impacts of this approach and intervention on children's family relations?

Outline of Chapters

Chapter Two reviews relevant literature from the fields informing this study. I begin with the historical background from cultural anthropology, ethnomusicology and literacy studies that situates *drummologie* as a science committed to the study of social institutions connected to the talking drums through the study of drum texts (transmitted without change from generation to generation for hundreds of years) as reliable source documents to expand our knowledge on

African societies of the oral tradition from the pre-colonial period. Much of the work in this field provides the foundation for a scientific treatment of drum language from which one can distinguish the *drummophonie*, that is to say, the translation of what is said on the drums, and *drummographie*, the text [in written form] of which the drum rhythm is the origin. It is important to remember that talking drum articulation utilizes musical perception to reproduce a spoken language in coded form. This drum language research will therefore require an understanding of speech surrogates, and necessitate a combination of elements from both linguistic and musicological methodologies.

Next, drawing on multimodality, embodied learning, situated learning theory and CHAT-inspired design-based research, I develop a framework for understanding children's literacy skills development in the context of a drum language community of practice. Design-based researchers' innovations embody specific theoretical claims about teaching and learning, and help us understand the relationships among educational theory, designed artifact, and practice by making design central in efforts to foster learning, create usable knowledge and advance theories of learning and teaching in complex settings. At this point, I introduce the theory of digital orality. Finally, relying heavily on culturally grounded computing and applied psychology research, the chapter investigates literature which looks at the impact digital learning environments have on early literacy, with a particular focus on tangible non-screen-and-keyboard-based computational technologies.

Chapter Three lays out the methodology and procedures used for data collection and analysis. I also describe the telemetric instrument designed to capture all of the activity data of participants using the *Alphariddims app* and *Urban Griot* platform. This chapter also introduces the sites and participants, providing details on pertinent characteristics of the individual activity settings and family cohorts. Finally, I present my positionality as a researcher.

Chapter Four traces the iterative development of the *UGP* curriculum and *Drumball - Alphariddims* prototypes in its preliminary phases. The application of the digital tools to the early literacy acquisition context of children ages 3-6 was born out of a design challenge in an *Urban Education* course that led to a participatory research process conducted during this formative phase of research, which is described. The sets of trial runs of the workshop all took place in Oakland, CA. The first two trial runs held in 2015 focused on probing people's perception and thinking around drum language as a mode of communication as well as investigating children's multimodal meaning-making through digital drum talk. From this, the *Urban Griot Playground* curriculum emerged with a focus on: sounds, letters, words and proverbs. The third set of trial runs of the workshop undertaken in 2019 centered on refining the workshop curriculum (games, activities, interactions) for the *UGP* embodied learning approach for teaching and learning early literacy and socioemotional skills that leverages the role of circle practices including multiple modalities (voice, rhythm and movement).

Chapter Five provides findings connected to research questions one and two, which center on children's multimodal embodied experiences across the face-to-face and digital contexts of the workshop. First, I present the final model of the *UGP* curriculum and *Drumball-Alphariddims* system used in the actual intervention, describing the preparation and reformulation of the pedagogical activities, tools and hybrid environment (face-to-face and online). Three major findings are highlighted. It was found that the *UGP* intervention contributed to: 1) children's early exploration of literacy behaviors through the use of a multimodal symbol

system deployed through embodied means (although the results were inconclusive on the efficacy of the proposed techniques for teaching word forms and spelling), 2) cultivating key social participation dispositions in children; and, 3) scaffolding the emotional understanding and social-emotional development of at-risk learners.

Chapter Six presents findings connected to research question three, which were informed by my workshop observations, the entry survey and interviews with parents, as well as the final focus group. Three of the findings emerged from the workshop observations and entry surveys/interviews with parents. Namely, it was found that: 1) the workshop provided means for parents to encourage and evaluate children's alphabetic knowledge, 2) some parents positioned themselves as participants and enablers of children's multimodal experiences, while 3) other parents exhibited behaviors that inhibited children's digital experiences, engendering tensions which had to be reconciled. The fourth finding stemmed from the focus group and highlighted the potential of the workshop model in expanding possibilities of early literacy and digital activity through cultural awareness. I conclude by exploring implications for parenting in terms of social and cultural factors influencing decisions of parenting style.

Chapter Seven interprets the findings from Chapters Five and Six using CHAT as a lens to highlight the design principles behind the factors of the intervention most connected to the outcomes for children, namely tools (including both cultural systems and technology infrastructure), community involvement and division of labor. I also discuss the significance of the findings in terms of the affordances of the workshop's ecology on children's learning on the community plane (apprenticeship into the UGP digital drum talk literacy practices), the interpersonal plane (dyadic activity guided by the parent) and the personal plane (participatory appropriation of the means provided towards personal ends). In closing, I talk about some of the limitations of the study and its findings as well as make some additional remarks on potential benefits of the research for atypical children populations with special needs.

Chapter Eight summarizes and reflects on the research, highlights the contributions made and presents possible next steps for how this research into culturally-grounded digital learning environments to stimulate multimodal literacy behaviors in pre-school settings may proceed. I conclude with some reflections on the significance of the UGP research being grounded in an African cultural paradigm at a time when anti-Black sentiment is growing across America, and educators are called upon to find new ways to transform the education system towards more equitable outcomes.

Significance

T'Challa faced a monumental challenge as protector of fictional Wakanda. Parents and teachers every day face the real and present challenge of ensuring that the next generation of children learn how to read and write in order to acquire literacy proficiency early. In teachers' practices, this often means a demonstration of how the curricular strategies, communication systems and cultural tools used within the social context of schools contribute to all students' learning and performance, not just those whose home or community environments/values are congruent with the dominant paradigm of schooling.

Most approaches to pedagogy take language in its written form of expression as the principal object of study, and literate persons as ones well versed in manipulating visual signs in

a complex, analytic or synthetic manner to produce socially-intelligible meaning. Yet, the changes in the conditions surrounding schooling brought about by the information technology revolution are such that we need to reconsider this epistemological bias towards ‘literacy’ which has predominantly informed what and how we teach. What I know, having been a lyricist, musician and percussionist for the last twenty years, is that rhythm is a natural medium that invites participation, sound production and movement. Furthermore, rhythm is a fundamental force in children’s lives, which can play an important role in their emergent language development. Since it is so tacit that one needs no special training to respond to it, as evidenced by rhythmic engagement, or entrainment, with the beat in music as early as infancy (Zentner & Eerola, 2010), rhythm offers a responsive medium with low barrier of entry for the engagement of children in multimodal activities (singing, dancing, body music). Through the mediation of a fully-developed embodied learning ecology of rhythm-based digital tools and applications, such activities might be extended to support literacy and socio-emotional goals. What I also know as a programmer and technology designer is that recent advances in human-computer interaction research and particularly haptic tangible user interfaces provide ample opportunities for transforming the learning ecology and practice of schools; a transformation which ultimately depends on the collective creativity and leadership of researchers, designers, parents and teachers. This design-based research was motivated by these technological shifts occurring beyond the domain of Early Childhood Education, but bearing important consequences for schools, and beyond.

A key element in the transformation of the learning ecosystem in schools must come through a reconceptualization of the modes of communication available to children from an early age. Ample research has demonstrated that reading successfully at third grade is a powerful predictor of later academic success. Unfortunately, educational opportunity gaps persist. If, indeed, we seek to close the achievement gap, we must rethink the standardized modes of schooling imposed on all students regardless of their diversity in historical, cultural and epistemological understanding of, or experience in, the world. As the basic purpose of school is achieved through communication (with speech and gesture being the first systems by which much teaching takes place, and in which students demonstrate to teachers much of what they have learned), it is at the level of the communication systems that we must intervene. Drums provide untapped opportunities, as *Black Panther* reminds us.

Culturally-grounded STEAM approaches to early literacy can help educators rethink the design of learning environments in ways that integrate the varied embodied experiences and cultural modes of literacy practice familiar to students, in order to fuel their academic and socio-emotional development. Despite the diffusion of technological innovations for today’s digital natives, there is a lack of computational media that supports and connects children’s early ability to produce rhythm with their needs of acquiring communication, literacy and social skills. By facilitating call-and-response interactions, a digital drum talk system offers the possibility for increasing the quantity and complexity of back-and-forth children experience (alone or in the company of others) while exploring the relationships between spoken, written and drummed representations of meaning. Thus, a single learner (or group of learners) could use the system to explore the patterns (i.e. the rhythms) of particular alphabet letters, vocabulary words and even entire phrases of varying word length by reproducing various beat patterns sounded with the *Drumball*, a regular drum, or even their own body. After all, if children are able to explore the alphabetic or syllabic patterns of words and phrases by (re)producing them rhythmically with

variation and dexterity (just as a writer would) through embodied multimodal call-and-response, why not investigate this as a method of early literacy instruction?

One central component of this model is therefore the notion of leveraging the potential of cultural tools and practices in relation to new media information technologies for creativity and learning that encourage active meaning *construction* rather than passive *consumption*. While mobile and tablet-based applications are rapidly becoming a principal medium through which children both play and learn through gestural and audio-visual interactions, the drum remains a ubiquitous musical instrument most children are familiar with, and drum language an important (and underutilized) way of knowing able to fulfill some of the communicative mnemonic and transmissive functions of writing that can serve as an embodied learning mode presenting a critical alternative to literacy acquisition for children in a way that works to alleviate some of the issues associated with the literacy practices that make up the bulk of the school day, and ideally work to reverse them.

Chapter Two – Literature Review

Theoretical Framework

The theoretical framework for this design-based study focuses on the integration of multimodal tools grounded in the talking drum cultural system for scaffolding the cognitive, socio-emotional and physical development of children. The key scholarly resources that facilitated me getting a better understanding of the issues in this domain and their implications for approaches to early literacy practices today, stemmed from cultural anthropological and ethnomusicological research on talking drums, the theory of multimodality and CHAT-inspired design-based research in applied psychology. The research thus follows the cultural anthropological perspective on the relationship of the drum language mode to orality and intends to produce a framework to support the development of multimodal literacies through culturally-grounded embodied learning environments and pedagogical activities. This framework introduces the theory of “digital orality” to conceptualize how to engage people (in particular, children) in playfully expressing themselves through voice, rhythm and movement in face-to-face and digital contexts. A theory of digital orality is concerned with the forms, functions and pedagogical applications of drum languages. It cannot do without the drum-oral connection which explains how the oral strategies for gathering, storing, retrieving and communicating knowledge have been *digitized* (as related to the fingers) on the drum, and aims to open new vistas into oral modes of thought, their basic noetic and mnemonic structures. The study aims to re-present the talking drum as a paradigmatic tool of oral cultures, in the same way that the pen (and computer keypad) are paradigmatic tools of literature cultures. My intent is therefore to bring together what we know about drum language modes to ideate on the design of embodied learning environments and pedagogies grounded in the cultural system of African talking drums.

A Brief History of Talking Drums

Figure 5 – ‘Atumpan Talking Drums’ Kofi Jatto (Ghana, 1921)



That there is a relationship between speech and drumming has been well documented by cultural anthropologists since the early 20th century (see Figure 5). In 1949, John Carrington reintroduced Western audiences to the concept of drum languages in his book *The Talking Drums of Africa*, an anthropological study of the Kele people and their speech surrogate system. Upon first arriving in the Belgian Congo on a missionary expedition in 1938, Carrington was struck by the fact that although there were no telephones, villagers deep in the bush would know about his coming. Later, he found that the local Kele people were communicating via drums, that each village had an expert drummer and that all could understand drum language, which echoes the rhythms of the spoken Lokele language. Consider the following excerpt from the introduction to *Talking Drums of Africa* (1949):

During my first few months as a missionary of the Baptist Missionary Society in the Stanleyville area of Belgian Congo, I was sent out, along with a more experienced colleague, to the villages of the Bambole forest on the south bank of the Congo. We had been working for some days in a village called Yawifa and we planned to make a half-day trip to the neighbouring town of Yaongama, some seven or eight miles away. When we arrived at Yaongama I was surprised to find the village teacher, the medical assistant and the church members all awaiting us in their schoolroom. Without attempting to discover by what means the news of our approach had reached the villages (we had sent no messenger from Yawifa)

we got down to the work for the day. But my silent queries were answered during an address by the native pastor which wound up our business at the village. He put a question to the assembled congregation in order to bring home some point in his talk. 'How did we know the white men were coming today?' he asked. 'By the drum message,' came the reply (7)

More Western anthropologists became interested in this phenomenon, and among them, Stern (1957) looked at speech surrogates and a general classification of signaling systems, by the size of the linguistic unit (phoneme or syllable, morpheme or word, whole utterance) to which a signal refers. He identified the phonemic, lexical/morphemic and message-unit points of reference, highlighting the ways in which a message is represented in abridging systems (like in Morse code), emphasizing that some of these modes of representation and transfer of spoken messages via drums include: phonemic representation (through encoding or abridgment), lexical representation (through direct transmission, translation, contraction, enphrasing and ideographs) and a combination of both (message- unit). Reproduction of speech as one of the fundamental strategies of African orality, whether the medium be a drum, horn or flute, thus includes both phonemic and lexical levels of representation, meaning that communication can occur either as a conventional code where pre-arranged signals represent a given message or as a linguistic signal where the instruments communicate through direct representation or simulation of the tones and rhythms of actual speech. In some instances, as in the case of the Douala (in Cameroon), a signal “conventionally opens and closes with a few strokes on the end surface of the drum; between these ideographic markers the name of the person addressed, that of the sender, and the message itself are cast in abridging terms” (Nekes 1912: 83).

Drummologie.

Drum ensemble performances in Africa typically do not occur as formal concerts given before an audience as in the West, but rather as part of various social occasions (rituals, weddings, funerals, civil and religious ceremonies, political/religious/sports encounters, in work or gatherings, and many other areas). For example, in the Northern Region of Ghana, among the Asante people, the role of drummers - called *ochtrema* in the local Twi language - has traditionally been to communicate to the people messages from the chief or king. Therefore, the drum (called *tchuene*) is understood in this context as playing an enunciative function, as its rhythms communicate to the rest of the members of the community, what may have been ‘said’ verbally by the chief. All over Africa, the master drum plays a vital role in the lives of the people. Some drums, like the *atumpan*, are also talking drums speaking in the high and low pitches and relative durations of the tone language. The *atumpan* in use by all the Akan peoples of Ghana performs in three different modes of drumming: the speech mode, the signal mode and the dance mode (Nketia, 1963). While dance drumming is primarily recreational, the signal and speech modes are played strictly for communication (Wilson, 2006, ¶ 2). Today, this drum has become somewhat of a State symbol in Ghana as “the mighty sound of this master drum is heard daily on the national radio as a station call introducing English and Ghanaian broadcasts. It is little wonder that the master drummer of the *atumpan* commands great respect in his society” (Hood, 1964).

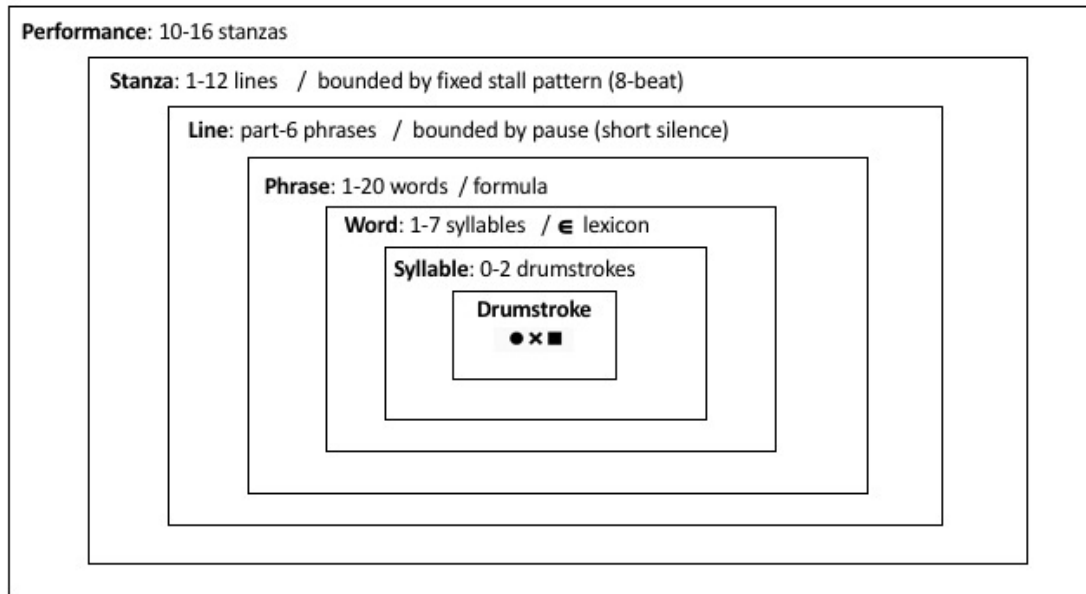
Established by the work of Niangoran-Bouah in 1981, *drummologie* is the science committed to the study of social institutions connected to the talking drums through the study of

drum texts (transmitted without change from generation to generation for hundreds of years) as reliable source documents to expand our knowledge on African societies of the oral tradition from the pre-colonial period. *Drummologie* provides the foundation for a scientific treatment of drum language. The etymology of *drummologie* can be traced to the words: ‘drum’, an English word for a percussive (musical) instrument that does not apply with complete success to the African instruments, which distinguish themselves by virtue of their communicative (linguistic) function; and *logos*, a Greek word that signifies the study or science of something. “From there, one can distinguish the *drummophonie*, that is to say, the translation of what is said on the drums, and *drummographie*, the text [in written form] of which the drum rhythm is the origin” (Niangoran-Bouah & Ahouo, 2003: 51). The understanding of the term which is built upon here suggests that the drum is a ‘technology’ of rhythm (derived from 17th century Greek words *tekhne* ‘art, craft’ and *logos*) used in oral societies in Africa. Clottey (2003) describes the conception of talking drums among the Ga-Adagbe peoples of Ghana where drumming is seen as a spiritual and universal technology used throughout history and across cultures who have honored the power of the spoken word and rhythm is seen as permeating all of the various spheres of life, spanning across all dimensions of the word.

In 2005, Coe looked at the national school policy recently adopted in Ghana, that led to the creation of state-sponsored cultural competitions which serve as a counter-part to school curricula to shape the way young people participate in the nation. Her research examined the motivation behind drum language competitions by looking at how the students created an alternative participatory structure for the drum rehearsals by leveraging their cultural heritage. Coe echoes the *listening pedagogy* which grounded the youth’s learning experience, as learning to drum was conceived as *following* the expert drummers, which typically were not found in school contexts, but rather in non-school contexts in which drumming and dancing happens. This work challenged the dominant discourse and conception of youth as having no agency/power in shaping their learning, providing a consideration of drum communications as a viable context for literacy learning and pedagogy.

Communication via drums can be divided into two types: conventional signal (i.e. pre-arranged formula representing a given message) and linguistic text (direct representation of spoken language following the tone and rhythm). Analyzing drum communications thus requires some knowledge of their morphology. The following diagram adapted from Neeley (1999) is helpful in understanding the structure of such communication in terms of its component parts. As the diagram shows, a complete performance consists of a series of stanzas, each bounded by a fixed stall pattern. Each stanza in turn contains several lines demarcated by a short silence, with each phrase combining multiple words (formula), each of which is made up of syllables represented by individual drum strokes. Drum language in its native context is therefore syllabic in that the pitch of each syllable is the information that talking drummers use to express and communicate verbal messages via drums.

Figure 6 – Drum Communication Performance Framework



In the next example, two students from a school in the Brong-Ahafo Region of Ghana, are performing in the Drum Language National Cultural Competition held in Cape Coast (May 1999). The drum poetry in this performance is notable not just because it is performed by a young girl (the winner, in fact), but also for the quality and speed at which she is able to intelligibly imitate on the drums phrases in Twi recited by her fellow student, to the audible applause of the audience in presence. The drum poem starts a minute and a half or so into the video recording, and its context provides us with a view of drumming as a method for delivering a speech to a large group of people as Akua stands next to Kwame repeating what he says by imitating the high and low toned qualities of his spoken utterance on the *atumpan*, thus amplifying the voice of the speaker without the need for any equipment.

Figure 7 – Drum Language Performance in National Cultural Competition (Ghana, 1999)



English Translation

1. *Lord Jehovah*
2. *He created the heavens*
3. *He created the earth*
4. *We don't have anything to praise your name,*
5. *We use the drum to praise your name*
6. *Tweneboa Kodua Berempon¹*
7. *One part is Odum²*
8. *One part is wawa³*
9. *One part is fontomfrom*
10. *One part is kakapenpen*
11. *The road crosses water*
12. *Water crosses the road*
13. *Which of the two is older?*
14. *He created the road to meet the river*
15. *The river is from long ago*
16. *The river is from long ago when the Creator created the world*
17. *The elders say,*
18. *The past has something to say,*
19. *The past has something to teach*
20. *The elders say,*
21. *The resting place of long ago,*
22. *We don't rest there*
23. *But*

¹ *praise of the drum personified*

² *a hard tree*

³ *another kind of wood*

24. *It is there that we rest*
25. *What they said long ago*
26. *We should respond 'abraw'⁴*
27. *The nation of Ghana has denigrated its
culture*
28. *For a tragedy to happen to us*
29. *Look at the tragedy that has befallen us*
30. *Some are the pregnancy of teenagers acting like women*
31. *Marriage to strangers*
32. *Drugs*
33. *And murder*
34. *Let us go back for it*
35. *And if we go back for it, we won't avoid it*
36. *It is bent but not broken*
37. *So let us go out from our culture's battle lines*
38. *So that the nation can wear a beautiful cloth*
39. *We thank you all.*

Because the national cultural competition as a context is primarily intended for young people to be challenged and evaluated by an audience of adults, Akua's uptake of the words of the elders in her speech can be seen as an effort to get her peers and other adults in the audience to regard her speech as having authority by its reproduction of the Asante elders' discourse which holds the past in high respect. In this regard, Sankofa is an important Adinkra symbol and principle that animates, directs and unifies the Ghanaian culture, by transforming and re-making the past so as to bring about a new creation. Sankofa is a proverb of the Akan people expressed in the Akan language as "se wo were fi na wosan kofa a yenki". Literally translated it means "it is not taboo to go back and fetch what you forgot" or, in the shorter adaptation, "go back and fetch it". Sankofa teaches that people must go back to their roots to move forward and that whatever they have lost, forgotten, forgone, or been stripped of can be reclaimed, revived, preserved and perpetuated (Bastian, 2003 via Williams 2006). This mode of drum poetry performance is significant as it reflects the point of view not of a foreign media institution (or person) externally defining the character of African culture and history in terms of its social ills, but rather of a young African woman or man, both symbols of Africa's future, speaking up for and to an entire generation. It can be said, according to the methods of critical discourse analysis, that Akua, through her speech act on the *atumpun*, is claiming a subject position as a leader of the Asante nation appealing to God directly to intercede in the affairs concerning the nation, by enacting what Van Dijk refers to as "an individual realization of group power" (Van Dijk, 1993: 254). This is reminiscent of T'Challa return from presumed death to confront Killmonger, exclaiming, again to the sound of the talking drums: "*I never yielded! As you can see, I am not dead,*" thus challenging his adversary's usurpation of the kingship, to rally his allies and re-secure, the safety of Wakanda.

⁴ *a term of respect*

Drum Literature

In a review of Carrington's book published in the *New York Review*, Freeman Dyson (2011) summarizes how the structure of the Kele language made drum language possible: Kele is a tonal language with two sharply distinct tones. Each syllable is either low or high. The drum language is spoken by a pair of drums with the same two tones. Each Kele word is spoken by the drums as a sequence of low and high beats. In passing from human Kele to drum language, all the information contained in vowels and consonants is lost. In a European language, the consonants and vowels contain all the information, and if this information were dropped there would be nothing left. But in a tonal language like Kele, some information is carried in the tones and survives the transition from human speaker to drums. The fraction of information that survives in a drum word is small, and the words spoken by the drums are correspondingly ambiguous. A single sequence of tones may have hundreds of meanings depending on the missing vowels and consonants. The drum language must resolve the ambiguity of the individual words by adding more words. When enough redundant words are added, the meaning of the message becomes unique. (Dyson, 2011 ¶ 3)

The method employed here is simple: every object and action is characterized not only by a single word, rather by a series of words that constitutes a short stereotyped phrase. The talking drums reproduce the high and low syllabic fragments of words contained in the utterance following the same prosodic variations as when spoken. For example, in Lokele, the word "moon" is rendered on the drum as the phrase *songe litangela manga* ~ 'moon looks towards earth' (---...). Of course, not all words have unique drum representations, and not all drum words represent the same verbalized meaning, as *lisaka* (·--) also means a promise, as well as a poison (·--). (Carrington, 1949). Since education in such matters is often necessary and requires knowledge of a broad range of disciplines, drum language can be seen from an epistemological perspective not only as a highly developed acoustic speech surrogate, but also as a way of knowing in the world. To orient readers unfamiliar with the literary forms that this type of medium provides, I reproduce below exemplar transcriptions of various drum communications among the Kele in the Congo:

*All of you, all of you,
come, come, come, come,
let us dance,
in the evening,
when the sky has gone down river
down to the ground
Announcement of a dance (Carrington, 1949: 61-2)*

*You will cry, you will cry, you will cry
Tears in the eyes
Wailing in the mouth
A death publicized on drums (Ibid.: 58)*

Later, in 1970, Finnegan published her seminal work in which she explained that drumming is indeed a mode of communication and a form of literature is clear when these principles of drum language are understood, and although its literary significance has been overlooked in general discussions of African oral literature, expression through drums often forms a not inconsiderable branch of the literature of a number of African societies. Finnegan's work on drum literature in Africa illustrated the variety of ways in which drumming is used in communal contexts to "call on" those present or within hearing distance to review the philosophy of the group (473), as in the Akan and Yoruba traditions. Finnegan observed drum language as a context of semiotic production providing a 'direct representation of the words themselves', a point central to this research interest into the connections and differences between oral, written and drummed modes of representation of meaning.

Nketia (1968) introduces non-stereotyped forms of drum communication (such as messages, announcements, poetry, elegy, call to arms, invocations, proverbs etc.). In this sense, drum language involves drummers as social speakers and their audience (near and far) as hearers in a type of rhythmic communication that is a way of knowing as complex and malleable as speech. In addition, drum language is also used for poetry, oral histories, proverbs and for naming. Names are typically elaborate and generally emphasize some individual characteristic and other commentary on the person concerned, such as:

*The path has crossed the river,
The river has crossed the path,
Which is the elder?
We made the path and found the river,
The river is from long ago,
From the Ancient Creator of the Universe*
Appellation to allude to the Paramount Chief (Nketia, 2018: 81)

A stinging caterpillar is not good disturbed
Appellation to allude to a Belgian government official (Clarke, 1934: 38)

Nearly every ordinary proverb can also be reproduced on drums, and in drum poetry in general, there is frequent use of proverbs to provide encouragement and incitement:

If a river is big, does it surpass the sea?
Akan proverb (Nketia, 1963: 47)

Ong (1977) observed that the drums belong, in a particularly intense way, to the oral world, a point also made by Jahn's (1961) in his statement echoed by Finnegan (1970) that "in a sense drum language fulfills many of the functions of writing, in a form, furthermore, better suited to tonal languages than an alphabetical script" (187). This drum-oral thesis provided the ground for the validity of the terms 'drum language,' 'drum literature' and 'drum texts.' This latter point is relevant to the theoretical framework of the current study on how the learning that takes place in trans-African cultural settings (like African drum and dance ensembles, or Capoeira Angola), which operate on the basis of an aural communication system (of which

drums – and other instruments – are a part), can facilitate multimodal literacy acquisition and social participation, and then see what the application of those principles in a conventional school context would look like for children who might naturally acquire information, knowledge, understanding, views of the world in such cultural settings.

Set against this cultural and historical backdrop, the implications of a digital drum talk mode of communication that can be leveraged by teachers, parents and children for play or learning are far reaching and manifold. It conceptualizes talking drums as a multimodal communication system that is concerned with the *forms*, *functions* and linguistic *applications* of rhythm as speech (drummophony) and writing (drummography). Second, it provides the historical and social framework of the use of talking drums as a uniquely African technology (the world's first wireless technology in fact), and therefore an appropriate cultural context for teaching children about Black Science, Technology, Engineering, Arts and Mathematics (B-STEAM). Lastly, the theory of digital orality developed here points to new vistas and learning pathways that leverage the kinetic, communicative, mnemonic and socio-poetic functions of African talking drums as a multimodal semiotic device that can augment parents' (as well as urban educators') pedagogy and practice. This dissertation explores the communication and expression of rhythm as a literacy practice that relates to the goals of early literacy acquisition through a digitally-mediated, multimodal drum technology.

New Literacy Studies

What this brief history of African talking drums helps us see clearly is that drum language is part of a spectrum of evolution of textual practices from oral to digital composition. Furthermore, as a system of communication, drum language is inherently multimodal, engaging oral/aural, rhythmic and kinesthetic means to represent and convey meaning. Its revitalization carries the potential of transforming the rhetorical strategies in writing/transmitting our experience in the digital age. Multimodality as a theory of education has brought about a shift in the aim of schooling to reflect a new focus on the awareness of the affordances of modes as literacy strictly speaking is no longer enough (nor confined to solely writing). This New Literacy episteme emphasizes the gaining of competency across different modalities. What is the relationship between drumming, speech and writing as means of communication? What are the theoretical implications of multimodality on the forms and contexts of use of drum language as a 21st century communication mode? What do these considerations bring to bear in relation to the transformation of the culture of teaching and learning?

Multimodality

Scribner & Cole (1981) developed a framework that conceives of *literacy as a practice*, which they define as “a recurrent, goal-directed sequence of activities using a particular technology and particular systems of knowledge” (236). As a concept, literacy practices can be distinguished from literacy events, a term coined by Shirley Brice Heath (1982) to refer to situations in which people engage with reading and writing. While literacy events refer to discrete situations, literacy practices refer to the larger systems which these events create within a community, and can be broken down into literate behaviors and literacy skills, which form the

analytical basis for this study. As Street (2000) writes: “literacy practices are the patterns of literacy events in a society; different domains may have different literacy practices, as literacy has different functions within a society, across domains. Street defines literacy practices as the “broader cultural conception of particular ways of thinking about and doing reading and writing in cultural contexts,” (79) and argues that literacy practice is not confined to just the moment that we see literacy activity revealing itself, but rather part of a set of cultural conditionings and positionings that allows an individual to be attuned and able to decode a particular mode of meaning-making. Street’s notions of ideologies in literacy practices brought about a critique of the autonomous model view of literacy in which literacy is a set of skills to decode a text autonomously from the cultural, historical, political, societal and ideological overcasting of what meaning even means in a given system or domain.

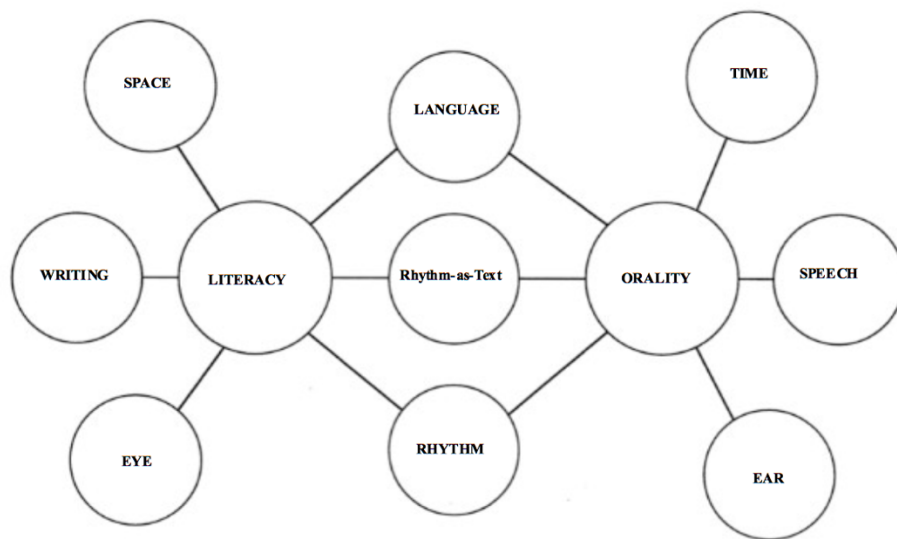
What this implies is that “as concepts, reading and writing—making meaning in and with texts—name practices and processes today that differ in many respects from those some 30 or 40 years ago” (Rowse, Kress, Pahl & Street, 2018: 1). Whereas the emphasis of New Literacy Studies researchers like Street is more focused on understanding and describing social environments where meaning is produced (and by whom), a social semiotic approach to multimodality aims more towards understanding the material realization of meanings in terms of the factors involved (agents, principles and resources for making meaning).

For Kress (2003), *mode* is a “culturally and socially fashioned resource for representation and communication” (45). Mode has material aspects, and it bears everywhere the stamp of past cultural work. However, the materiality of mode holds specific potentials for representation, and at the same time brings certain limitations. This is exemplified in the fact that “printing so obviously makes knowledge accessible to all that we are inclined to forget that it also makes knowledge very easy to avoid,” as Phillipotts put it in her book on Icelandic literature (1931: 162-3). This is why it could be argued that schools need to balance the emphasis for students to demonstrate literacy competencies (defined as *reading* and *writing*) with multimodal abilities, as “how people talk about, think about and carry out the work of school, the tools that get used in the process, and the questions that get asked regarding reform or change” matter a great deal (Eubanks, Parish and Smith in Hall, 1997:1).

Semiosis, also, can be defined as “the making of signs, outwardly as articulation or inwardly as interpretation, complex or simple, large or small, in the socially shaped environments of everyday lives” (Kress, 2010:44). Gee (2003) defined semiotic domains as “any set of practices that recruit one or more modalities (e.g. oral or written language, images, equations, symbols, sounds, gestures, graphs, artifacts, etc.)” (18). I will use this dual understanding of literacy practices and semiotic domains here in defining drum language as a mode of literacy practice to support the multimodal semiotic activity of young children. Brockmeier & Olson (2009) spoke of a 'literacy episteme' to describe today's postmodernist view of literacy as one of several modes of 'semiotic mediation'. As such, it is hard to conceive of literacy as strictly writing, since the medium through which the writing is done (paper, blog, text, email, etc.) literally *in-forms* the meaning of the message itself, as noted by McLuhan (1967). So, 'new literacies' or 'new media literacies', depending on both old and new forms of knowledge representation, serve as carriers of meaning of a different order than spoken language, precisely in light of this *artificiality* (as in artifice, or artifact).

This is where we have to consider the cultural styles associated with the education of children, in light of the different assets and resources children from different cultural backgrounds bring to the classroom, as “tradition has specifics for any given society,” (cultural group) in that it inevitably requires specific choices with regard to the word rituals and practices to preserve tradition through language, whether oral or literate (Havelock, 1986: 69). This inquiry into the nature of drum language (or rhythm-as-text) and its applications to the exploration of multimodal literacy behaviors among very young learners was motivated by the fact that modern debates about literacy education are typically framed in terms of competing approaches to teaching *reading* and *writing*. The more I thought about the concept of speech surrogacy, whether it be by pen, print or electronic means (email, text, blog etc.) from the vantage point of drumming and drum literature, the more I became convinced that there was indeed something about the African talking drum system which put it in a class by itself. The fact that, in its expressive function, drum literature, like “oral literature can, in principle, be employed in almost any circumstances in which there is an audience” (Finnegan, 1988: 76), turns the drummed communications of many oral traditions into a context for multimodal literacy, drawing on both oral language and rhythm, as semiotic domains. Figure 8 below is an attempt at illustrating the relationships between this rhythm-as-text modality, literacy and orality.

Figure 8 - Concept map of Rhythm-as-Text Semiotic Domain



What this diagram suggests is that the activity of drum communication can be viewed as an authentic literacy practice, and drum language rhythms and their associated spoken utterances as legitimate *texts*. Drum language can thus be considered a *semiotic* domain, in that it is an aural system of sign making to be deployed for social purposes, a set of possible kinds of meanings that can be made, although realized through a different communicative modality than conventional speech and writing. Building on this understanding, I consider speech (oral modality), writing (visual modality) and drum language (rhythm-as-text modality) as constituting different dimensions of the word (with different affordances and limitations) within a spectrum of textual practices, whose tools and forms are informed by cultural, historical and social factors.

As learning today is taking place in a context where the possibilities of choice are increasing, this constitutes another important reason for leveraging rhythm as a modality of communication. Especially since children, parents and educators in most urban and rural environments have at their disposal unprecedented access to various means and tools to mediate children's early literacy practices, as a result of the myriad ways in which the modern world of multimodality in information and communication technologies has brought about an explosion of traditional conceptions of literacy (or 'language') as "the sole, let alone the major means for representation and communication" (Kress, 2003: 257).

Like talking drums, writing systems or scripts are also speech surrogates, albeit *visual* (i.e. related to the dimension of space and the eye as the organ of perception) rather than *aural* (i.e. related to time as a dimension, and the ear as the organ of perception). One crucial difference between the oral and literate modes is this factor of dissemination (acoustic versus spatial). While the written word (through the medium of the page or screen) is the primary means of dissemination in literate communities, communication in the oral context comes across as performance as well as a sequence of *spoken* words. With rhythm-as-text, human speech has been converted into surrogate sounds for transmission by means other than normal vocal articulation of speech itself.

In this sense, drum language as a pedagogical approach is pointing to a focus, not on drumming as a musical activity, but rather as a literacy and communication practice resulting from the assignment of meaning across various semiotic domains, not just the visual. Whereas speech, our most uniquely defining quality as human beings, operates on the plane of sound (time-based) in relation to our aural sense, writing gains its duration from being a space-based mode that operates in relation to the visual plane ('seeing' sense). By treating rhythm as aural text that is stored tacitly through embodied memory, drum language creates a time-space bridge (or continuum) between these two poles (orality versus literacy), allowing drum texts of the past to be retold in the present, in their exact form and without relying on the technology of writing. This principle of African talking drums is one of the paradigmatic and epistemic phenomenon of oral cultures, with relevant pedagogical implications. Since "knowledge changes its shape when it is realized in the different modal material" (Kress, 2003: 50), not only could these shifts in school culture have an impact on the forms of imagination, they can also have significant affective and cognitive consequences, notably in relation to social development and identity formation. This view is echoed by research findings that have shown that learners inhabit each mode differently and uses the resources of each mode in different ways" (Stein, 2007: 44).

In the field of early literacy, alphabet knowledge is defined as the ability to name, distinguish shapes, write, and identify the sounds of the alphabet, and is considered the best predictor of children's later reading and spelling abilities (Hammill, 2004; Scarborough, 1998; Schatschneider, Fletcher, Francis, Carlson, & Foorman, 2004). Preschool and kindergarten students with poor knowledge of letter names and sounds are more likely to struggle with formal literacy instruction, fall behind and be classified as having reading disabilities (Gallagher, Frith, & Snowling, 2000; O'Connor & Jenkins, 1999; Torppa, Poikkeus, Laakso, Eklund, & Lyytinen, 2006). For these reasons, alphabet knowledge constitutes a critical learning milestone for young children, and facilitating its development has become a primary objective of pre-school instruction and intervention. However, despite all the efforts following the No Child Left Behind Act of 2002 which required literacy standards for prekindergarten and kindergarten students to

include letter name learning, basic sound knowledge, and letter writing, most approaches do not take advantage of the kind of multimodal learning experiences involving voice, rhythm and movement that the UGP embodied learning approach using the *Drumball-Alphariddims* technologies makes possible, although some do, like the work of Wolf and Patel, which I discuss later in Chapter 3.

Beyond early literacy teaching and learning (strictly speaking), drumming is rapidly becoming recognized and utilized as a medium for personal growth and development, for the enhancement of community feeling and for physiological and psychological healing (Friedman, 2000: 3). Bittman's evidence-based studies of adults (2003: 19) and adolescents (2009: 1) confirm the biopsychosocial efficacy of group drumming school-based programs, and other researchers have suggested that the introduction of drumming within the social context of schools can "significantly improve a spectrum of behavioral problems in children, such as inattention, withdrawal, depression, posttraumatic stress, anxiety, attention deficit, hyperactivity, oppositional defiance and sluggish cognitive tempo" (Ping Ho, 2010: 2). In particular, "African drumming has been shown to offer numerous psychological benefits by encouraging social interaction, building skills that can make a meaningful contribution to society and by promoting a sense of competency in participants (Longhofer & Floersch, 1993: 3); by facilitating self-expression, non-verbal communication and improved physical, emotional and mental health (Kalani, 2004: 12); and by providing an opportunity to creatively channel negative emotions such as anger and frustration (Hull, 1998: 199).

Emerging from this type of research are numerous approaches to integrate drumming in schools, founded largely upon behavioral theories of change, placing little emphasis on literacy development. While understanding the efficacy of drumming on positive socio-emotional and behavioral change is important, what may be equally important for literacy educators and researchers is to design and examine situations to learn about the hidden power of the drum as a communication system. As drum language is very much based on verbal language, one cannot understand how it works without understanding the linguistic structures that it builds on. For digital natives, the need is to show them the application of rhythm as a modality to communicate in any language or via any medium, not just in the context of African drum and dance classes, as beneficial as those can be.

Embodied Learning

Embodied learning is an emerging field fueled by educational technology innovation that has not been thoroughly researched yet, but which holds great potential in terms of student engagement. The basic idea behind embodied learning is that students who fully use their bodies to learn are more engaged in the lesson than they would be simply sitting at a desk or computer. This dissertation used design-based research as a strategy for developing and refining embodied learning literacy practices through the design and integration of a rhythm-mediated communication system grounded in the drum language cultural system (*Drumball-Alphariddims*) in the context of a family workshop (*Urban Griots Playground*). From this perspective, the integration of drum language and rhythm-mediated tools in early childhood education builds on familiar embodied modalities of learning (like singing, dancing and drumming) in both school and out-of-school environments to provide new avenues for children to reinforce listening, speaking, reading and writing skills, by moving their bodies in order to produce meaning in

diverse settings, and towards a variety of multimodal literacies and socio-emotional outcomes.

As Kress (2003) wrote, embodied cognitive functions, “modes carry memory, history and affect,” making it important for each human being to learn by relating how he or she has used modes in the past” and that “communication, whatever the mode, always happens as text.” (47) What this implies, as Gee (2003) noted, is that “classroom instruction should lead to meta-knowledge, to seeing how the discourses students already got relate to those they are attempting to acquire, and how these relate to self and society” (117). This design research effort presents several opportunities for both the education and literacy studies communities to investigate new culturally-affirming ways to teach students new literacy skills by leveraging their skills and aptitude for rhythm. By exploring embodied rhythmic communication, students can assert their tacit and cultural knowledge as they learn about rhythm patterns of letters, names, words and sentences, in general. Multimodal embodied learning technologies open up new forms of interaction and multiplicities of representations, “taking into account that language in a globalized society is more than reading and writing skills” (Kjellsdotter & Hashemi, 2015:139). While orality has received some attention in literacy research, relatively little of Western education theory and practice has thus far addressed the role of rhythm-as-text in oral cultures and its potential relationship to the development of new media literacies in contemporary society. Once there is an understanding of the dynamic nature of rhythm-as-text, the need for augmenting the drumming medium as a computational, tangible system of information representation and communication follows effortlessly.

CHAT-informed Design-Based Research

Design-Based Research

Design-based research is increasingly used by educational researchers as an effective means of advancing domain-specific knowledge as well as to improve practice in concrete, practical ways. Consequently, this section describes the embodied learning apparatus designed and how the digital, verbal and physical activities and resources were developed through a design thinking process purposed on mediating early literacy practices via rhythmic communication and multimodal tools. The pedagogical applications of the system as a scaffold for early literacy acquisition as well as the proto-theory of learning emerging from its use will be in focus here. The *talking drum* built upon the premise that the drum is an extension of the mouth, and thus serves a social function akin to writing, being both speech surrogates used to communicate verbal language at a distance. The *Drumball* is a new media technological innovation inspired by the talking drum and its drum language cultural system that aims to make it possible for children with no prior drum knowledge to communicate and explore language via rhythm-based practices and tools, as an alternative to conventional methods.

Design-based research (Brown, 1992; Collins, 1992) continues to be used as a paradigm for the study of learning in context through the systematic design and study of instructional strategies and tools. From this perspective, educational interventions are viewed holistically, and as enacted through the interactions between materials, teachers and learners. Importantly, design-based research goes beyond merely designing and testing particular interventions, as interventions are conceived of as embodying specific theoretical claims about teaching and learning, and reflect a commitment to understanding (and refining) the relationships among

theory, designed artifacts, and practice. “The value of attending to context is not simply that it produces a better understanding of an intervention, but also that it can lead to improved theoretical accounts of teaching and learning. In this sense, design-based research differs from evaluation research in the ways context and interventions are problematized.” (Design-Based Research Collective, 2003: 7). Therefore, this is a design-based study to ground the theory of digital orality through the design, implementation and assessment of a culturally-grounded embodied learning ecology (curriculum and digital tools), how it works and what can be done through its use to transform early childhood education in ways that improve children’s literacy behaviors and multimodal meaning production skills.

The early formulation stages of the research were spurred on by a design challenge in a course on *Urban Education* at the UC Berkeley Graduate School of Education in which the inquiry questions related to the impact of new multimodal technologies on the practice of urban schooling were:

What exigencies do urban schools face when their traditional roles in learning and social development are being dramatically augmented or entirely circumvented by new, highly engaging, multi-modal/multi-textual ways of creating and accessing knowledge for personal pleasure, social networking, political activism, and entrepreneurial activities in addition to academic pursuits? How can we, as urban educators, come to view youth as learners who have varying degrees of access to and facility with a vast array of learning resource, institutional and social spaces where learning and literacy practices attempt to serve individual, community, and societal needs and desires?”

Drums provide a good context for design-based research to explore the potential outcomes of culturally-grounded multimodal embodied learning environments, as they provide a foundational cultural system and circle practice framework for guiding the early literacy and socio-emotional experiences of children in ways that they are already familiar with, from having been exposed to such contexts and practices from an early age (live music, drum circle, dance class etc.). Building on the history of talking drums and theory of multimodality, the goal of this study is therefore to conduct exploratory research into the design of new multimodal embodied learning ecologies inspired by trans-African cultural systems and communicative practices with the objective to improve the practices and strategies parents, urban school educators and policymakers make available to children in the early years (ages 3-6) in order to support their affective, cognitive, social and identity development. My goal has been to see what the application of these strategies in a learning context or any other such cultural settings would look like for children who might naturally acquire information, knowledge, understanding, views of the world in trans-African settings that easily facilitate children’s organic linguistic acquisition and social participation in voice, rhythm and movement activities.

To this point, this design-based research departs from a letter-centric concept of literacy grounded in the alphabetic code to explore rhythm as a context to learn various structured forms of meaning. Fundamentally, the *Drumball*-Alphariddims system is designed to promote language and literacy awareness in pre-readers through auditory, tactile and kinesthetic modes of interaction to compose rhythm-as-text. By observing the dynamic relationships and experiential aspects of oral and drum communications (i.e. call-and-response), the system provides a multimodal interface to transduce semiotic objects (letters, words, phrases) into their rhythmic, verbal, textual or visual representations. What is innovative about this approach is that it

introduces a new multimodal symbol system that is grounded in an epistemological feature of West Africa's oral cultures (the drum-oral principle) in order to position *digital drum talk* as an empowering embodied mode of literacy that can help to reframe how we introduce young learners to multimodal literacy practices.

Cultural Historical Activity Theory (CHAT)

This section presents a cultural historical activity theory lens applied to the design of the rhythm-mediated tools in the UGP learning ecology. As introduced in Chapter 1, CHAT is a system of theorizing on how people interact in their environment through the use of tools and through the activities that are associated and mediated by tools, coming from Vygotsky, Luria, Cole (and other theorists associated with the emergence of cultural psychology). CHAT centers on three core ideas: 1) humans act collectively, learn by doing, and communicate in and via their actions; 2) humans make, employ, and adapt tools of all kinds to learn and communicate; and 3) community is central to the process of making and interpreting meaning—and thus to all forms of learning, communicating, and acting (Vygotsky, 1978).

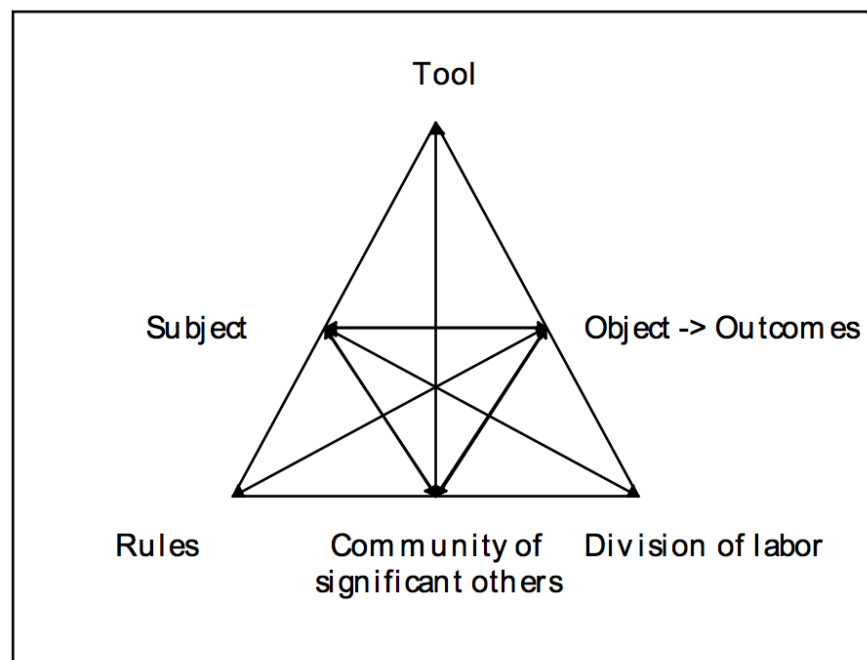
CHAT as a research lens can be applied in various ways at the level of the personal, interpersonal or institutional plane (Mentz, E., De Beer, J., 2017). In my case, I use CHAT as a lens of analysis as it offers a holistic and contextual method of discovery that can be used to describe and explain the complex dynamics of literacy learning and development that occur in early childhood educational settings. From this, it is possible to gain better understanding (and thereby innovate) on the community (related to the whole group dynamics), interpersonal (related to the child-parent relationship) and personal (related to the individual's use of mediational artifacts) factors that inform the object (outcome) of the activity of early literacy acquisition for young children (i.e. improved alphabetic, aural/visual literacy skills). Despite significant differences among them, modern approaches to reading distinguished two major component of the process of decoding (the process by which letters of the alphabet are associated with corresponding acoustic patterns) and comprehension (the process by which meaning is assigned to particular visual/acoustic representation) (Burns et al, 1999). By designing culturally-grounded, multimodal embodied learning tools (*Drumball-Alphariddims*) in which all of the theoretically important aspects of reading and writing are brought together through rhythm-based, multimodal, call-and-response interactions, the *Urban Griot Playground* approach to early literacy intervention offers a context to investigate crucial pedagogical questions on how to motivate children to engage in reading, how best to help children break the code, and how to sequence instruction. This CHAT-informed design-based research approach uses interdisciplinary methods to study embodied learning and literacy development by following some key theoretical principles:

1. *Mediation of experience through artifacts* – material and symbolic artifacts (tools) mediate human actions and are modified over generations (cultural-historical)
2. *Activity as the essential unit of analysis* – mediated actions in learning activities situated in an educational context constitute a genuine object of study
3. *The cultural organization of human life* – culture consists of all the material/ideal artifacts (tools, signs, practices etc.) that mediate human activity
4. *The primacy of the social* – social others have a primary role in the development of psychological processes of children because it is only by already enculturated adults

- arranging for the child to appropriate the cultural heritage of the social group that specifically human, culturally mediated, forms of psychological life became possible
5. *Genetic analysis* – seeking the origins of current phenomena by studying their history (Laboratory for Comparative Human Cognition, 2010)

Within the CHAT framework, an activity system is a collective formation that is multi-voiced and multi-layered, comprising of six core components: a *subject* (or actor), an *object* (or outcome), the *tools* employed by the subject to act on the object, the *community* of significant others involved with the object, the *rules* that regulate the community and the *division of labor* among subjects. From this theoretical perspective, the actions that comprise an activity system are tool-facilitated, however there is no inherent characteristic of an artifact (i.e. a human-constructed instrument, in either material or conceptual form) that determines its role and function as a tool in an activity system (Foot, 2014:14-16).

Figure 9 – Model of Activity System, by Engestrom (1978:78)



In the context of the Early Childhood Education activity system which the UGP workshop intervention is a part of, the *tool* consist of all the tangible and conceptual means employed to mediate literacy learning (books, audio, videos, *Drumball* device, *Alphariddims* symbol system and mobile app, drums etc....), the subject is the child, the *community of significant others* includes all other workshop participants as well as family and community members involved in the child's early language and literacy practices (caregivers, extended family members, educational researchers like myself etc....) whose work is organized according to a particular *division of labor* (parents raise children, teachers write and deliver curriculum, researchers conduct studies, companies produce learning toys and instructional resources etc....)

and governed by *rules*, which are the cultural and language norms, social conventions and requirements established by the community (local community values, national literacy standards, etc....) to guide the collective activity in the pursuit of the *object-outcomes*, which is to answer the need for children to acquire the necessary multimodal literacies and socio-emotional competencies.

Keeping with the CHAT approach, rather than strictly focus on individual children's learning, the aim of the research is also to look at how people interact in their environment through the use of tools and through activities that are mediated by tools. As Kuuti (1996) noted, a distinctive aspect of activity theory that is particularly important for analyzing complex social practices is that it acknowledges contradictions, conflict, and breakdowns in coordination as inevitable in the functioning of any system. CHAT gives an interpretive power that the standard tools of qualitative/quantitative data analysis alone don't provide, in terms of the long term view/potential when the design research around the application of the *Drumball-Alphariddims* tools (device+app) is fully completed, by looking at how this theory helps to understand the literacy activities and socioemotional experiences that are mediated by these tools (both in the workshop and at home), identify potential breakdowns or pitfalls and the set of resources, rules, roles, and division of labor enacted by the community to facilitate "the work", which is all focused around the children's evolving literacy behaviors and socioemotional development through rhythm-mediated interaction.

Basically, through this CHAT analysis, I looked to discover the elements of community, interpersonal and personal interaction and how these modes of engagement in meaning-making are viable lens through which to understand children's meaning production in much more complex ways than just what we might see on the surface of a 4-week workshop. This interpretive power of CHAT as a lens for historical analysis will come most strongly to bear when the continuation of the research allows me to open the aperture wider to be able to incorporate a more longitudinal perspective that extends beyond the 4-week of the workshop (through the dissemination of the *Alphariddims* mobile app to parents, for example), as well as implement comparative research in a more congruent context (like Ghana) where the existence of drum language as a social practice is more culturally meaningful to analyze as an activity system (given its widespread adoption), to grasp the systemic whole of the activity, as this makes possible the analysis of a multitude of relations, both at a particular point in time, and as it evolves over time, which in turn informs the design and integration of the *Drumball-Alphariddims* technology tools.

Towards a Theory of Digital Orality

To transform the traditional culture and standard pedagogy of American schools, a leap in thinking may be necessary to reimagine the possibilities for teaching and learning through modes congruent with and sustaining of the ways with words of many children who inherit a rich tradition of using expressive movement as part of their everyday learning and communicative behavior (Cole & Boykin, 2008). From the perspective of the new multimodal information and communication technologies available today, like the computer and the Internet, the playing field of the literacy-orality debate has been levelled, as every mode (written, visual, auditory) becomes "part of the fabric of representational resources" available to individuals, whether speech, text or rhythm. My argument is that a drum language-based approach to literacy acquisition (by its

multimodal nature) combined with technology innovation could facilitate the inclusion of embodied and performative modalities of learning that help young children experience more culturally-diverse styles of communication across a wide range of academic context and subjects (language, history, art, music, dance, mathematics).

While orality has received some attention in literacy research, relatively little of Western education theory and practice has thus far addressed the role of rhythm-as-text in oral cultures and its potential relationship to the development of literacy in contemporary society. In its primary usage, orality refers to the verbal mode of oral cultures untouched by writing and print, as contrasted with secondary orality, the electronic orality of present-day technological cultures, implemented by telephone, radio, television, and other instruments dependent for their existence and use on writing and print. In my work, by digital orality, I mean the application of digital tools to support today's predominantly secondary orality.

While it is commonly acknowledged that children learn best when they are active, the standard approach to early childhood schooling (especially in low-income areas) favors a passive mode of learning focused on the decoding and encoding of print, often overlooking one of the first (and perhaps most important) steps, which is motivation. As Mahiri and Maniates (2013) write: "it's getting them to listen, to participate, to be ready... That's the tough part" (256). This is noteworthy as, when literacy-supporting technology is found in most school classrooms, it often resides in a standard keypad-display styled computer interface, which makes it difficult for children to involve their voice and body in play. This dominant cultural and standardized pedagogical design of American schools, which restricts physical movement and favors learning impassively fails to include as an integral part of the literacy practices those cultural activities, modes and systems responsive to many children who come from backgrounds where voice-, rhythm- and movement-linked activities are the norm.

Like Coe, I am of the opinion that participating in society by learning drum language and taking up the subject position of a drummer communicating public meaning in the context of school or after-school activities is a kind of formal *apprenticeship* which requires a combination of discipline and practice across multiple semiotic domains. Thus, positioning children as apprentice drummers in the context of out-of-school literacy play activity relates to the developmental goals of school in that, like reading from books, communicating via rhythm is a skill that is learnable. It has explicit techniques, and practice leads to improvement through social interactions in community.

Supporting children as they prepare themselves for later literacy involves more than knowing how to form letters with a pencil, but includes other skills and behaviors connected to awareness of metalinguistic norms and conventions like making one's communicative intention known, treating language as an object or maintaining cohesion and reference in storytelling. Conceptualized and designed as a distributed sociocultural constructionist system, the *Drumball-Alphariddims* integrative cultural system is intended to bridge the school, community and home contexts of emergent literacy learning and socialization by tending to these aspects. Harrell (2013) introduced the concept of *integrative cultural systems* to refer to cultural systems (such as the blues or Japanese computer role-playing games, for example) that are transmitted through, and enacted within, media. In this manner, the cultural system of drum languages is metamedial as it is not restricted to a single medium, and thus can be expressed and shared via a range of

media, including computational media. Distributed constructionism draws on “distributed cognition” (Salomon, 1994) to extend the constructionist theory of learning and strategy for education (Papert, 1993), by “recognizing that cognition and intelligence are not properties of an individual person but rather arise from interactions of a person with the surrounding environment (including other people and artifacts)” (Resnick, 1994 ¶ 8), to design and construct personally-meaningful artifacts to be shared publicly with others in the context of knowledge-building communities (Scardamalia & Bereiter, 1991). As Harrell (2009) explains in defining the term cultural computing, it is uncommon to develop computational systems which explicitly engage, and are grounded in, cultural practices and values that depart from the privileged discourse surrounding computing practices. While new communication technologies and interfaces are expanding the contexts and modalities with which learners can interact, few have explored how “diverse ways of representing and manipulating semantic content and distinctive relationships between humans and our (digital) artifacts can form the basis for new technical and expressive computing practices” (¶ 23). In particular, no educational technology research efforts have engaged an early literacy theory of language acquisition through drum language practice to support gains across the oral-written spectrum.

This pedagogical application and technology innovation of drum language practices represents a powerful transformative potential for early literacy practice. The fact that the combination of this centuries-old cultural system with the power of computational media can result in new multimodal forms and context of communication makes digital drum talk a viable strategy for meeting the new literacy standards suggested by the theory of multimodality. Through design-based research, educators can investigate and fine-tune the design of learning ecologies grounded in the community and cultural principles of drum language to iterate on more robust multimodal embodied activities and digital tools that involve the manipulation of rhythmic symbols (tone, slap and base) through physical or human-computer interaction in order to express meaning and communicate. As an example of such culturally-grounded embodied learning tools and environments, the *Drumball-Alphariddims* system used in the *Urban Griots Playground* provide a research context for investigating the impact of digital drum talk as a mode of early literacy teaching and learning.

CHAPTER 3

A Design-Based Research Methodological Approach

The design-based research approach used in this study builds on the theoretical framework introduced in Chapter 2. In the present chapter, I discuss the methods used to document children's multimodal meaning production experiences in their development of early literacy and socioemotional skills in the *Urban Griots Playground* workshops. I also document the roles parents played in support of children's literacy and socioemotional development within the workshops. I begin with an overview of the research design model and the intervention implementation process. I also describe the parent-children dyads who were my study participants and indicate those who became focal participants and the rationale for their selection. Next, I outline the types of data collected across three phases of data collection (pre-workshop, workshop and post-workshop). Specifically, I describe the pre/posttest, workshop observation, parent interview, survey and focus group protocols I developed and used, including the passive methods of data capture (audio, video and telemetric). In the final part of the chapter, I discuss the coding process forming the basis to my approach to data analysis, including the audio/video selection and analysis choices.

Research Design

Design-based research, which blends empirical educational research with the theory-driven design of learning environments is an important methodology for understanding how, when, and why educational innovations work in practice (The Design-Based Research Collective, 2003). Design experiments are extended (iterative), interventionist (innovative and design-based), and theory-oriented enterprises whose "theories" do real work in practical educational contexts. These theories are relatively humble in that they target domain-specific learning processes. (Cobb, Confrey, diSessa, Lehrer, Schauble, 2003). Design-based research uses mixed methods to analyze an intervention's outcomes and refine the intervention. In addition to developing innovation and local instructional theories, another purpose of design-based research is to find out what is possible for children to learn with adequate means of support (individual or group tasks, instructional sequences, curriculum, technology-mediated learning environments, e.g.). There is a growing body of evidence that there are links between early rhythmic skills, musical training and phonological awareness (the ability to understand that words are made up of individual sounds that have to be segmented out and that can be manipulated, and that's a key step in learning how to read (Patel, 2013; Wolf, 2012). In the case of the *Urban Griots Playground* study, the local area of investigation is on how exposure to embodied modes of communication using rhythm might help to motivate children who are at-risk of not acquiring key literacy skills like alphabet and vocabulary knowledge? What are the materials, tools, tasks and participant structures we would need to support and accelerate this particular type of learning? What are the preconditions for full implementation?

The goal of the research is to apply operative constructs and principles from embodied call-and-response practices (through voice, rhythm or movement) towards the transformation of the learning ecology available to children (ages 3-6) through the design of multimodal embodied

learning activities and technologies supporting the early stages of literacy acquisition (alphabetic knowledge, vocabulary knowledge, aural/visual literacy). The *Drumball* concept was introduced as a type of hybrid music and writing support whereby children can play rhythms to produce alphabet letters and words that can be sounded out and shared with others, however given the prototype stage of development of the complete system (which consists of a peripheral device and a web interface), a tablet-based alternative was used to introduce the *Alphariddims* symbol system in the context of a word spelling game. Sessions involved singing, drumming, dancing and conversation around socio-emotional issues such as happiness, sadness, sickness, anger or fear, and their embodied/visual expressions. Parents played a central role in the mediation of all language and music activities.

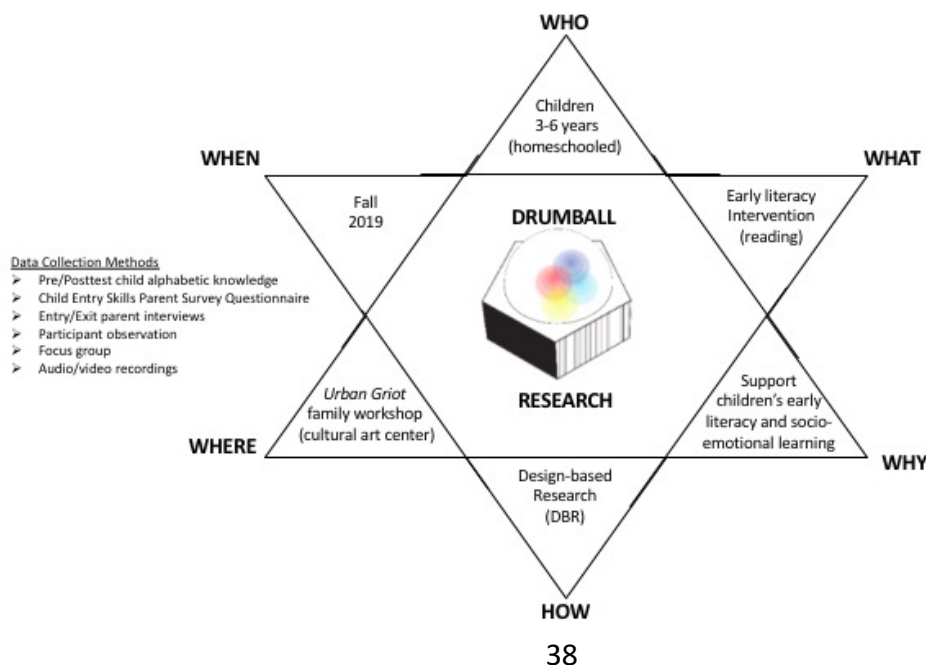
The principal focus of this study was to document and analyze the affordances of integrating multimodal call-and-response strategies in the literacy and play practices of families by looking at the residual impacts of the UGP approach on the literacy behaviors, emotional understanding and social participation dispositions of children from week-to-week, and at-home.

The data collection methods used include: pretest and posttest scores, surveys, participant observation, interviews and audio/video recordings data. These are analyzed to answer the research questions that probe the affordances of integrating multimodal call-and-response strategies facilitated by the *Drumball-Alphariddims* system on children's early literacy experiences, by exploring the relationships between embodied learning environments, literacy and socio-emotional development.

This dissertation addresses the following questions:

1. What are the impacts of culturally-grounded, embodied learning environments and activities using the *Drumball* and *Alphariddims* mediated in the *Urban Griots* approach to multimodal experiences on children's literacy development particularly in the area of aural/visual literacy skills related to letter naming and word spelling?
2. What are the impacts of the same approach on children's socioemotional development?
3. Finally, what are potential impacts of this approach and intervention on children's family relations?

Figure 10 – *Urban Griots Playground* Study Overview



Methodological Approach

The essence of the actual intervention was tied to the idea that embodied learning that uses digitally-mediated multimodal call-and-response interaction can open up the array of ways that children can, in a multiple intelligences orientation, access various kinds of learning that might not be as accessible through primarily *oral or visual text*-based mode of engagement with literacy activities. I use design-based research methods to explore how the *Drumball-Alphariddims* communication system can serve as a support for encouraging literacy behaviors through embodied multimodal call-and-response activities in a community of practice - the *Urban Griots Playground* workshop for families (UGP). A single focal group was examined and used the designed embodied learning games and e-learning activities to explore alphabet letters, names and their spelling (3 to 7 letter words).

As encompassing both an interactive family workshop and digital media platform extension, the *Urban Griots Playground* cultural system underlines the intensively communicative social context needed to support outside-in components of literacy (peers and adults who care) and uses specific mediating devices (print, visual drums and digital tools) to scaffold children's learning through structured family activity regulated by social norms established in community with other families. Children in the workshop completed various multimodal meaning production tasks (verbal, visual, kinesthetic and digital) centered on using the *Alphariddims* symbol system. The core of the procedure was to employ the natural social organization of the group as division of labor (child-parent dyads) and create a set of tasks (or quests) to be completed and shared out by each child-parent pair, each of which held a particular place in the overall circle process, marked by a colored disc on the floor. At any given time, participants played one of two roles, *leader* or *follower* in a *follow-the-leader* call-and-response type process, whereby the *leader* performs the task first, in repetition, before being followed along by the rest of the group. The tasks were:

- Vocalize, embody and drum the sounds (using the mapping - tone, slap, base)
- Vocalize, embody and drum the first initial of your first name (using the code)
- Vocalize, embody and drum all the letters in your first name (using the code)
- Vocalize and spell the animal names in the *Alphariddims* tablet game (using the code)

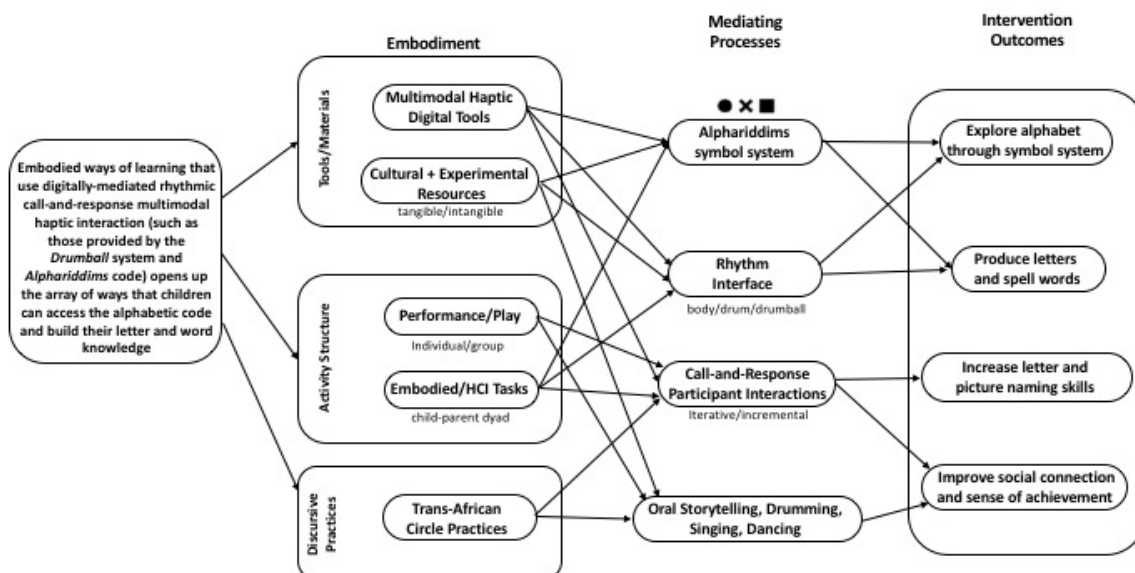
During the tasks, all the participants were provided with drums and tablets to drum up letters and words as a way of exploring the alphabet letter names and their sounds, after first embodying the patterns with their own bodies. The codes were printed and handed out to every participant, who were encouraged to practice with them in between sessions, at least one time. There was also a ritual clapping after each performance to celebrate the achievement of every child. The whole act of multimodal meaning production was not the responsibility of any one participant, but rather was embarked on by the community as a whole and supported beyond the workshop time-space by an online community of learning of which each parent-child dyad was also a member with a user profile giving them access to additional resources and tools to continue the work from home. This framing opens the possibilities for any young child and family who participates in the intervention to have particular benefits that can be documented and analyzed. In future iterations of the intervention, a controlled study will examine differential outcomes of control and research cohorts in order to discretely compare the specific affordances of the full-fledged *Drumball-Alphariddims* approach.

Conjecture Map

Conjecture mapping is used in design-based research to render explicit researchers' hypotheses about the crucial components and relationships in a designed innovation, and thereby distinguish between *design conjectures* (how designed features of a learning environment will function in their intended setting) and *theoretical conjectures* (how such functions mediate learning and produce intended outcomes). Such a conjecture map provides some features of an *argumentative grammar*, that is to say, the “logic that guides the use of a method and that supports reasoning about its data” (Kelly, 2004:118).

It was my starting conjecture that the *Alphariddims* symbol system can offer support for developing children's early multimodal literacy skills given that, as a conceptual tool, it can operate across multiple modes of representation, namely: the visual mode, through the representations of letters as symbol patterns; the embodied mode, through the translation of symbol patterns into body movements; and the aural mode, through the production and interpretation of rhythmic sounds as meaning in the environment (letters and words). We know from the research that “the alphabetic principle—beginning with the cognitive understanding that each visual letter corresponds to a sound—underlies children's capacity to learn their language's sound-symbol correspondences. As Wolf & Goffwald (2009) explain, to read the word duck, children must recognize each symbol, connect the corresponding sounds or phonemes, and blend them together to form the word. In the process, they utilize the repertoire of skills we call phonological processes.” Extensive research confirms the effectiveness of direct sound-symbol instruction on the development of phoneme awareness and decoding skills (Adams, 1990, Lundberg, 1991; Stanovich, 1991; Torgesen et al., 1999), therefore the design was approached with this intended goal in mind. By proceeding incrementally from drum sounds, to letter names and sounds, to word spelling, and introducing adequate multimodal supports, tasks and structures of interaction for each learning goal (f2f/digital), the design could allow us to see how possible it is to accelerate the children's process of acquiring the phonological awareness and proficiency required to segment and blend phonemes in words, which is usually honed over hours of explicit instruction and repeated practice.

Figure 11 – Initial conjecture map of a design to promote children's literacy skills related to letter naming and picture naming through embodied multimodal activities and tools



Task Structure

The first task in the workshop instructional sequence is concerned with the embodied and drummed expression of *Alphariddims*, which are introduced in terms of the pitch of the drum sounds they represent, and are also mapped to specific body movements: x: base (low, stomp feet), · tone (middle, slap thighs/torso), – slap (high, clap hands). From there, the second task is for children to express the first initial of their first name using the code using cards with letters of the alphabet mapped to 4-beat patterns based on these 3 sound-symbols. Through this, children internalize the *Alphariddims* code as a transmodal resource that can be deployed visually, physically, rhythmically or verbally to produce meaning. To complete the third task, children must recognize and embody the 4 symbols in each pattern, connect the corresponding letter and blend them together to spell their full name. The fourth task extends this process into the digital realm through the *Alphariddims* support app where children can explore and practice the spelling of more vocabulary words using the system.

Participant Structure

Another key feature of my methodology was my choice to have parents as participants (as the first teachers in young children's lives), with myself as the main facilitator for the program throughout the four weeks of the workshop. The reason for this choice is triune.

Firstly, by attending the workshop, parents would be able to register on the *UrbanGriot.org* site and access supplemental resources from home that made use of the same *Drumball-Alphariddims* tools and materials introduced in the workshop. This would help to reinforce children's learning.

Secondly, from a practical standpoint, the presence and active participation of parents had a logistical impact on the implementation of the workshop in light of the children's young age, as play and learning activities were conducted in terms of parent-child dyads and thus allowed for an organic sense of community and 1-on-1 interactions with someone the children were already very familiar. The fact that this particular group of parents (almost all) knew each other, was an unexpected benefit in this regard, as the sense of community was strong and palpable with clear rules for the children and an organic division of labor among parents (for example, communicating through a mailing list, coordinating rides for families coming from Mt Shasta, taking turns bringing food for the break). This also posed some challenges, given that the community already had its rituals in place, which made it somewhat difficult at times to introduce and produce new structures of play and learning.

Thirdly, the participation of the parents allowed me to establish a high level of rapport and direct line of communication with parents, which in turn greatly facilitated the survey/interview process. A Doodle link with 30-minute interview time options for parents to choose from was circulated via the mailing list managed by the *mama* leader who organized the workshop. The same protocol was followed for the children's entry skills inventory online questionnaire (parent report).

Focal Site

Performing Arts Cultural Center (PACC)

The study took place during the fall of 2019 at Performing Arts Cultural Center (PACC), located in Siskiyou County. The space is available for rent for conferences, concerts, classes, spiritual retreats, dancing/yoga. An outdoor patio holds up to 90 people (approximately 1,620 square feet) and the large interior room holds up to 80 people (approximately 1,600 square feet of indoor space), with excellent acoustics, beautiful hickory floors and the original brick walls. PACC is mostly known as a quality venue for performing, literary and visual arts from the local community and surrounding regions. The *Urban Griots Playground* was the first family workshop series of its kind offered at the center.

The majority (two thirds) of the families at the *Urban Griot Playground* live in the town, some in the local neighborhood surrounding the center, while a third come from the neighboring city of Mt Shasta, which is 79% White, 11% Latinx, 3% African American, 2% Asian American and 1% American Indian, Filipinx, Pacific Islander, respectively. Mt Shasta has a slightly better, yet mixed academic record, with half of the schools performing at the state average and half of them below. One unique aspect of the study population is that it is composed entirely of young children who are homeschooled, and therefore do not attend any of the local district schools or pre-schools, so the statistics on the school district are not provided here as they bear little impact on the present study.

“Music Is Healing” Open House Event: Instrument Petting Zoo

The research was first introduced under the banner of *Music Is Healing* during Summer 2019 as an all-day Open House event with special guests (an African Drum & Dance duo based in Houston, TX) and the main attraction for local families being an Instrument Petting Zoo. This event marked the beginning of the first public phase of recruitment as it was widely advertised and subsequently covered in the local newspaper. Recruitment was also done through public outreach efforts via flyers, word of mouth, stage and radio announcements as well as via social media, providing the link to a TicketLeap reservation page containing the study details and contact information allowing interested parents to initiate contact by signing up and providing their email address. Initial contact with the *mama* who eventually recruited the homeschooling group was made through this Open House Event, which she had attended with her 3-year old son and her husband.

Urban Griot Playground (UGP)

The *Urban Griot Playground* is an early literacy program designed to improve the language and communication skills of young preschool children and facilitated through embodied modes of learning in a group-based setting. The program brings together parents and children to experience performing arts practices from the African diasporic community (singing, drumming, dancing) as vehicles for acquiring multimodal literacy skills. The curriculum is inspired by trans-African cultural systems and blends the practices of drum and dance, call-and-response and drum language with the multimodal computer interaction affordances of the *Drumball-AlphaRiddims* technologies. The goal of the family workshop is to develop the literacy

and social skills of children through structured games and activities that make use of sounds, letters, words and phrases that can help them increase their alphabet and vocabulary knowledge. Additionally, the cultural and linguistic elements of drum language communication play a major part in the framing of the workshop, a choice that was not accidental, in light of the goal of the study to develop culturally-grounded embodied learning experiences and digitally-mediated environments that engage children to increase their own multimodal literacy skills through the integration of embodied, oral/aural, visual and digital modes.

The *Urban Griot Playground* at PACC met once a week for four weeks starting on October 28th 2019. Each session lasted less than two hours and started (or ended) with a circle, where we sang a song after letting the children know what we were going to do that day and then recapped what we had done the week prior, before introducing new activities. This assembly time was dedicated to families connecting in-person in a safe space through various types of circle group interaction (drumming using call-and-response and zip-zap-zop, a game focused on trading sound effects). Next, we explored patterns and letters through rhythm using their first name initial *Alphariddim* in the context of voice, drumming and body movement exercises that were first demonstrated, and then reproduced by each child-parent dyad. Lastly, given the multimodal literacy focus of the study, the last segment of the workshop curriculum focused on the extension of the drum interaction between each parent-child pair into the digital realm through the *Alphariddims* app and *UrbanGriot.org* web platform.

Along with aspects about the physical site, there were several aspects about the study's cohort which made the implementation of the workshop (as it had been envisioned) challenging.

First, some of the parents with younger children had questions regarding the e-learning portion and were concerned about the use of tablets in the workshop and the amount of screen time to be expected. To those, it was clarified that the technology would be only used minimally to introduce the concept of digital drum talk by exploring *Alphariddims* letters and words via the tablet after having practiced how to embody and then play the basic beat patterns on the drum. So we centered the workshop sessions on embodied learning and multimodal call-and-response activities, reserving the digital screen time for the culminating activity of the final session, which was a severe drawback.

Second, the infrastructural organization of the site, although quite pleasant to be in, with its broad open space, large windows viewing the street and spacious outdoor space (with a creek running through), did offer many inviting distractions to the attention of 3 to 6 year olds, which posed severe challenges in terms of completing the lesson planned for each day.

Third, the center was not equipped with instruments, nor a computer lab or laptops, so the responsibility to make drums and computers available was left up to parents, which many seldom brought. To resolve this, I brought in sound, projection and recording equipment along with seven mini-djembe drums and borrowed four Galaxy Tab A tablets for families to use and share.

Workshop Space

Figure 12 – *Urban Griots Playground* workshop space



The *Urban Griot Playground* took place in the main room at PACC, a space originally designed for live concerts with a stage to the left immediately when you walk in and a bar along the side wall, opposite the walk-in ramp. The typical configuration for most events here is to either have rows of chairs or small round tables spread out across the room, neither of which were an option for this workshop. Before the first session, I met at PACC with the director and our *mama* leader to discuss the intended space layout and time flow based on her experience with the group. From this meeting, it was decided that we would set up in a circle right in front of the stage and parents would bring blankets and mats so everyone could be seated on the floor. For safety, everything else was cleared out of the way (tables, chairs) or placed out of children's reach (scissors, glasses, utensils etc.). The raised stage area was used as the main space for voice, rhythm and movement presentations/demonstrations. A white board resting next to the stage recorded the schedule for the day as well as key concepts to remember. PACC let us use their projector screen which was used to show selected videos as well as walk through the online site. Parents were encouraged to bring their mobile phones to be able to look up children's favorite songs or dance moves, as part of some of the creative learning activities. Finally, a Bluetooth speaker amplified the accompaniment or background music used as part of some instructional activities.

Participants

The inaugural cohort consisted of 13 children (and 10 parents). All names of people have been changed to pseudonyms. The criteria used for selecting focal participants was based on attendance and completion of both the pre- and post-test. Of the 13 children who began the

workshop, four of them took both the pre- and post-test (Olem, Sam, Cam, Arfia), although one child (Machi) attended every session but did not complete the post-test, so the analysis will center primarily on the data sets of these five focal children. One parent had two children in the workshop (Cam and Arfia). Consequently, those 5 children (and 4 parents) are focal participants.

Children

The 5 children in the *Urban Griots Playground* were between 2 and a half and 6 years old, and were enrolled in the program by their mothers who accompanied them and remained present for each session. Although I did not interview the children directly, given their very young age, I collected detailed qualitative data about them from the mothers through the child entry skills survey questionnaire as well as the 30-45mins phone interview. On the first and last day, parents were also asked to administer a 3-min alphabetic literacy test. Finally, selected segments of each session were recorded to capture audio and video traces of the activity as it unfolded over the 4 weeks. The selection, transcription and coding techniques are described later.

Table 1: Summary of Focal Children

Child	Gender	Age (years)	Age (months)	Personality/Character (Mama Interview Report)	Parent Name	Parent Education/Training
Olem	Female	3	40	curious, content, fun-loving, very verbal,	Olivest	Architect
Sam	Male	3	39	fiery, emotional, aware, intelligent, funny	Solibren	Instructor/Writer
Cam	Male	6	72	smart, observant, detail oriented	Alcanat	Creative Media
Arfia	Female	3	36	courageous, outgoing, talkative, smart		
Machi	Male	2.5	26	driven, confident, patient, funny	Malabri	Art Director

Focal Dyads and Triad

1) Olem and Olivest

Olem was three years old (40 months) at the time of the study. Her mother Olivest describes her as curious, content, fun-loving and very verbal. She does know all her letters as evidenced by her perfect score on the pre-test. Although she has started using a pen, she cannot really write, but is intentional about the way she uses it to draw shapes or letters, which come out more as little scribbles. She is interested in spelling right now. Her mother has been reading to her since birth and she has a really good memory from memorizing the events and words on each page of the books that she can be engaged with for a long time. One of the things she has difficulties with is with some of the letters that she'll get confused like 'W' and 'M' or 'n' and 'u'.

Olivest has been a parent for three and a half years. A former architect, she had many artistic interests while growing up, particularly in art and music, although computers did not come in until later in college, where she studied architecture, which combines math and art.

While she is not able to play as much, her husband plays a number of instruments (percussion, drums, guitar, flute). Both she and her husband used to play Taiko and were part of a performing group in Mt Shasta, so they introduced it to their daughter, Olem, pretty early on, and she took interest to it, by watching and playing. She has her own drum and likes anything that involves beats and rhythms. Since Olem is so young, Olivest wants her to have as much experience as possible and create a more expansive world, which is what motivated them to join the program.

2) *Machi and Malabri*

Machi was two and a half years old (26 months) at the time of the workshop. His mother Malabri describes him as driven, very confident, extremely patient and pretty funny. He's pretty shy right now and still pretty attached to his mother. He has started reading already, or at least recognizing certain letters on the page (like "Oh", "No" or "Stop"). He started with Dr. Seuss (Hop on Pop) and has been reading short words and finding them in other books. He enjoys dancing, and has been dancing since he was an infant with his aunt who is a folkloric dancer, so sometimes he spends the week over there and almost every day he'll dance with her while she completes her practice. Although he is very energetic and never stops running when he is outside, he takes a lot of patience and time when playing with his toys, an activity which brings him comfort anywhere. His favorite is playing with cars. He likes to figure out how he can make the car fall from different places. Lining them up. Organizing. Stacking. Balancing while pushing. He also enjoys playing with his play dough, a toy computer, a mini house or watching Bumble Nums.

Malabri's most recent job was working at a Junior High School. Before becoming a parent, she was the art director of a camp in Boulder Creek for people with disabilities (ages 4-80), where she designed daily activities and programs in collaboration with the music therapist. Before that, she worked at Chipotle and was a manager there. She also had a year-long internship experience working with a Museum where she hosted birthday parties for children and talked to them about art. She was the Editor for Sacramento Fashion week for 5 years and in this capacity, wrote blogs, did photography and helped direct the event. Her artistic interests include the full spectrum of the visual arts (sculpture, painting, drawing, photography) and music (violin), except dancing. Socialization is their primary motivation for joining the program, to provide Machi with the opportunity to be around kids.

3) *Arfia, Cam and Alcanat*

Arfia was also three years old (36 months) at the time of the workshop. Compared to her brother, she is a bit more courageous and less reserved about jumping into new things. She is outgoing and likes to talk to everybody, so she makes friends easily wherever she goes, even at the park. She has her own ukulele. She's not reading yet and has not demonstrated much interest in letters, but loves listening to audio books (sometimes more than 15 times for the same one). She plays together nicely with her brother Cam. They like a lot of imagination play (with blocks, cars, trains, stuffed animals) and riding their bikes. They also like to draw and cut things out and lot of hands-on sensory kind of things.

Cam was six years old (72 months) at the time of the workshop. He is more observant than his younger sister Arfia and likes to sit and take in the situation before he gets involved in something. He likes details and understand how things work. He does not read although he has known letters for a long time, before he was two. When he was a baby, his mother was still married and so had more time to sit and do things with him than she does now. They did a lot of reading, going through the alphabet in books and learning sign language as well, which may

have had an impact on his language skills also. He can write his letters now and can read a few words that he has memorized from one of the early learner books he plays with sometime.

Alcanat studied media production in college and earn her BA from George Washington University in Film and TV production, with a Minor in art. She has always been interested in creative stuff, and did freelance work for a while. She has a passion for music, and is currently a single parent with 100% custody of her two children (Cam and Arfia). She played the violin for 8 years, as well as the saxophone for 3 years and a little bit of bass guitar and chose to join mostly for the interaction and for connecting with other kids, parents, family in the community.

4) *Sam and Solibren*

Sam was three years old (39 months) at the time of the workshop. He is very emotional (carries lots of fire). Although he enjoys being read bedtime stories a great deal, he does not read on his own yet and has some letter recognition (3 letters, at the time of the pre-test). Although he plays excellently with adults, he has a difficult time playing with other children, which has been a challenge for his parents. He will lash out physically, so they have to be next to him. As a result, he plays mostly by himself, riding the bike, which is his new thing, or with the ball. He also has a little train set, or plays with his musical instruments, blocks and stuffed animals. His parents encourage a lot of freedom and to use his imagination, running around and finding creative outlets for his energy.

Solibren is originally from Southern California where most of her family, which she describes as humongous, still lives. Before giving birth, she did after school programming at a high school in the Bay Area, where her identity as a social justice instructor was forged. She also did a lot of labor organizing for a Women's group in Oakland, which is the place where her son was born. I met Solibren during the first Music Is Healing Open House at PACC during the summer of 2019. In addition to teaching, she is also a writer and has been making her own zines for seven years. This is her ultimate means of creative expression to which she finds outlets by selling them online or attending lots of zine fests. As a result of the housing crisis in the Bay Area, she moved to Dunsmuir and experienced some difficult times of transition amidst the shifts. Sam, who is three years old, is the first grandson in the family. She was motivated to join the workshop for him, in hopes that being in a space that is intentionally organized to be in a group setting, he could learn how to relate successfully with others in a positive way.

Data Collection Procedures

Data collection (including entry and exit interviews) spanned a 6-week period, and the workshops occurred for four weeks at the site on Mondays for two hours. Data included a parent online survey on child multimodal skills inventory, a 30-min entry and exit phone interview of parents about children's music and literacy habits at-home, participant observation during the workshops, audio-video recordings and focus group discussions, and a pre- and post-test of alphabetic knowledge to examine the research questions on the *impacts of culturally-grounded, embodied learning environments and activities mediated by the Urban Griots approach to multimodal experiences on children's development of literacy and socio-emotional skills.*

Table 2 below summarizes the phases, sources and types of data collected.

Phase of Data Collection	Sources of Data	Types of Data
Phase I	Child Pre-Test (parent-administered)	Entry Alphabetic Knowledge
	Parent Pre-Survey (Online)	Child Multimodal Skills Inventory
	Parent Pre-Interview (Over-the-phone; semi-structured)	Home & Family Context
Phase II	Participant-Observation	Workshop Sessions (1-4) * Video recordings * Audio transcripts * Reflection notes
	Workshop Documents	Materials * Curriculum & Lesson Plans * Handouts & ‘Assignments’ * Online Resources
Phase III	Child Post-Test (parent-administered)	Exit Alphabetic Knowledge
	Parent Focus Group (Open-ended)	Final Debrief
	Parent Exit Interview	Child Multimodal Literacies
Phase IV (Future)	Telemetric Game Data (Online, parent-moderated)	<i>Alphariddims</i> App (Version 2.0)

In Phase I, I facilitated the survey and interview protocols with the four focal parents and two additional parents enrolled in the *Urban Griot Playground*, a process that was initiated via email the week prior to our first session, and took until the second week of the program to complete. The purpose of these instruments was to get a holistic view and baseline of children by the end of the program during the workshops, audio-video recordings and focus on perceptions of child’s personality (behavior and character) and ii) a child multi-literacies skills inventory (see Appendix).

During Phase II- The Four Workshops. In the first workshop, the pre-test was administered to all children (on the first day), and I recorded selected audio/video portions of their performances on each task, while observing the parent-child interactions attentively. I

concluded this workshop by assisting parents in creating an account on the UrbanGriot.org platform where they would be able to access and try out online resources including the *Alphariddims* game, which is both playable from the browser and also as an app installed on a tablet (unfortunately, none of the participants actually tried the platform from home). In addition, I also wrote reflection notes after each of the four workshop sessions and based the design of the following week's workshop activities on these memos. The post-test and focus group were completed during the final workshop.

In Phase III, I conducted exit interviews with the focal parents who had participated in the all four workshops of the study to better understand the nature of their experiences with the *Urban Griot Playground*'rban Griot Playgroundhe nature of their experien However, only one exit interview was secured.

In Phase IV, the revised and enhanced design of the *Alphariddims* app (enriched by the lived experience of the workshop) will be disseminated to parents via the online platform. The telemetric data collected in this phase includes the activity data of participants using the app by tracing players' actions throughout the virtual context of the game (scores, levels, scenes etc..). This data is beyond the scope of the current discussion and will constitute the focus of future research.

Leading up to, and following the intervention, I also met with the Design Team members, either in person or remotely. These meetings were informal in tone and held on an as-needed basis, usually to troubleshoot a problem in the app design concept or implementation, prepare for upcoming events where the app might be used/tested, or to reflect on changes needed based on users' experience or feedback. I audio recorded our sessions and took notes as we spoke, and later transcribed and coded these notes to highlight the various design challenges, solutions and principles that emerged from the pilot study. This data along with email exchanges offered good opportunities to document, reflect and learn from the design process which is discussed in detail in Chapter 4.

Phase I

Pre-Test

On the first day of the program, I facilitated an alphabetic knowledge pre-test administered to all 12 children by the 9 parents present on the first day. Prior to administering the test, verbal assent was obtained from the children themselves, after having first informed them why we were here at the workshop and how we would be spending our time learning together (playing circle games using different instruments, singing, dancing, but also working at the table using the phone or computer). Children were also informed that it was ok if they didn't want to be here and do the things that we were getting ready to do; they could stop at any time and neither I nor anyone at home would be upset. The test included all 26 letters of the alphabet, in both lower and upper case, or 42 letter items total. Children were given 2 minutes to name the letters one by one, with parents marking correct answers with a check mark, and ignoring incorrect answers on the recording sheet (see Appendix A). The same procedure was used for the post-test conducted at the end of the workshop and these numbers used to compare levels of alphabetic knowledge of each child from pre to post-workshop.

Pre-Surveys

During the first week, I conducted a survey questionnaire with the parents consisting of a child entry skills inventory and questions on their media habits. The survey asked parents about their feelings regarding their child's vocabulary growth at this age and the types of activities the children enjoyed as well as their reading, play and media habits. 7-point Likert scale items probed their level of enjoyment for each activity (drawing/painting, singing/playing music, video games, sports, acting, movies/TV shows, books/bedtime stories, storytelling); while 3-point and 5-point rating scales gauged parents' frequency of engaging in these activities with them. The survey included some open-ended questions including the favorite artists or genres of music they liked to listen/dance to and their favorite movies/TV shows. Finally, a checklist of various multimodal skills that the child had demonstrated ability of doing (writing with a pen, talking on the phone, typing with a keyboard, taking photographs etc.) coupled with the parents' answers to the follow-up interview questions on their multimodal skills, literacies and play habits provided a rough profile of each child participant.

Entry Interviews

After their preliminary survey was completed, parents were asked to schedule a 30-min phone interview during which I asked them preliminary questions about their personal background before becoming a parent, their primary occupation, artistic/creative leanings, and present family context (partner, history and community). The main questions focused on their child's literacy and socio-emotional behaviors, exploring particularly any prior experiences involving the modalities of play engaged with in the workshop (singing, drumming, dancing) as well as abilities and dispositions that the parents wished to further encourage in the children, including their personal motivation for participating in the study. All of these interviews were recorded and transcribed.

Phase II

Observations, Video/Audio Recordings, Reflection notes

Starting on the first day of the workshop, I made careful observation of the children's level of engagement in group or dyadic voice, rhythm and movement activities with each other and their parents. Each of the four sessions lasted about 90-minutes, and I recorded most of the entire period in audio and captured selected segments of the activities as video. I also wrote reflection notes following each workshop, recording my impressions of the children's and parents' participation (comprehension, engagement) and used these observations to fine-tune the next session's lesson plan. One of the main changes that occurred as a result of this process (including direct feedback from the parents) was to lessen the focus on the digital learning initially planned and focus more instead on the embodied/musical activities. Given the young age of the children, and the fact that most of the parents did not bring in laptop computers or engage in the online space, I chose to shift the design of the curriculum and reinforce the learning of the *Alphariddims* code through body movement and drumming instead and wait until the last session to introduce the online and tablet applications. On occasion, I held side conversations during breaks with parents about key moments of the session. In total, I recorded 2 hours 22 minutes of video, and 3 hours 17 minutes of audio. My rationale on when to turn on the video camera was based on what I considered to be key events related to my research questions around embodied multimodal call-and-response interaction using the *Alphariddims* symbol system. There were 4 main video clips of primary interest, one for each workshop's culminating task.

Post-Test and Focus Group

We concluded the last workshop with the same alphabetic knowledge assessment protocol, after having completed the activities planned for that day, and held an informal focus group for parents to share-out openly any observations, final take-aways, suggestions and all-around feedback they might have on the potential benefits, values and applications of the workshop (activities, tools, resources) at home or at school.

Phase III

Exit Interviews

The opportunity was also given to those who wished to talk more about their child's at-home experience with the workshop materials by scheduling a time for an exit interview, which was made optional. The exit interview focused mainly on the participants' engagement with the digital application and online materials from home. Only one of the parents completed the exit interview.

Data Analysis Procedure

The results of a design experiment often take the form of retrospective analyses focused on the theoretical intent of the study (Cobb, Confrey, diSessa, Lehrer, & Schauble, 2003; Gravemeijer & Cobb, 2006). Given my dual intent do contribute to both the development of a local theory of early literacy instruction and to the design of culturally-grounded embodied learning environments and tools that support this theoretical approach, the iterative process of analyzing the entire data was aimed towards this end. In the conclusion chapter, I elaborate on how these retrospective analyses contribute to design implementation knowledge for future cycles of intervention.

The observation of the sessions allowed me to note patterns and areas of strength or difficulty for each child. The process of adapting the subsequent sessions was informed by these insights on their learning styles, needs and abilities (complemented by parent reports from the entry interview and survey questionnaire). As a result, several aspects of the original design had to be reformulated (i.e. paired down) to fit the cognitive and behavioral stage of focal children.

Next, I grouped the interview and survey data of each child-parent dyad or triad, and assigned descriptive codes to note the content related to dimensions of my research questions (literacy behaviors, social participation style, emotional understanding and/or challenges, uses of and perspectives on music and technology etc.)

Because of the workshop structure as discrete instructional moments, I took a manifest content approach to audio/video data analysis, in which moments focusing on particular pedagogical or subject content was selected out and examined in a first pass (typically the culminating activity). From there, I use a more detailed part-to-whole deductive approach to look at specific characteristics of the activity focusing on participants' interactions in the context of engaging with the tools. I applied both conversation analysis and interaction analysis techniques to examine verbal and nonverbal expressions, respectively, making note of participation structures and child cognitive engagement with the tasks. The audio recordings were systematically analyzed using conversation analysis techniques to sample episodes not captured on video that are used to reflect on and improve the instructional design (script, materials, tasks, participant structures, mediating processes etc.).

One of my main purposes in analyzing the participants' interactions was to evaluate how well the *Alphariddims* system (in its various modal embodiments – visual print, embodied and

digital) enabled or motivated children to develop alphabetic knowledge and an understanding of the concepts and process of reading and writing. Another purpose in the interaction analysis was to evaluate the socio-emotional effect of the workshop activities on children based on their verbal and nonverbal expressions (sounds, movement, body language) toward their parent and each other.

I also looked at the difference between post- and pre-test, focusing on those children who displayed shifts in alphabetic knowledge and culled through each workshop's data (each having a different constellation of families) to find occurrences of the letters learned within the activities or materials. Finally, these pre- and post-test scores of focal participants are looked at within the context of their experiences as gleaned from the qualitative observations, surveys and interview data (e.g. parents' reported perceptions of literacy strengths and challenges, play habits and learning style) in order to discuss the potential in the mediating processes of the *Urban Griot* approach towards the transformation of early literacy instruction and how to integrate new forms of interaction and modes of technology use that can support the early skills development of pre-reading children by leveraging multimodal call-and-response strategies that connect embodied rhythm and language.

Researcher Positionality

For nearly 10 years, I have been innovating new pedagogical strategies, research methodologies and technological tools for integrating drumming and drum language into early childhood education (and beyond) by engaging with professional drummers, literacy experts and tech designers, integrating culturally-grounded and digitally-mediated teaching practices, designing collaborative community events, forming partnerships with schools, cultural and arts organizations, using and applying research on technologies for creativity and learning, and networking with computer programmers. Coming out of such experiences, my goal in pursuing this dissertation has been to deepen my practice as a teacher, educational technologist and community organizer, and increase my capacity to support child development and learning in underserved communities, domestically as well as internationally. Given my special concern for education and technology as important factors of development in an international context, with a focus on developing countries, I wished to apply my cultural curiosity about what my own traditions had to offer towards the improvement of teaching and learning, both in formal and informal settings. Like some of my colleagues before me, I have experienced the frustration of having to wait until graduate studies to learn some crucial and in-depth aspects of my own history and culture. Through the course of this research, I have learned that many educational theorists, practitioners and policymakers still view orality as problematized in a world dominated by written and print communications. One colleague during the early stages of the work even referred to drums as 'primitive or primal' during a presentation on the *Drumball* at the School of Information. My work in many ways has been motivated by a need to correct such pejorative views of African culture. I embarked on this research inspired to build on all of the trans-disciplinary research efforts on drum language to date with full expectation that this work will continue to be refined, shaped, and influenced in coming years by future generations of teachers, students and scholars of the diaspora.

As a researcher in *drummologie*, I am very much interested in how a drum-based pedagogy could empower young learners through culturally-grounded approaches, strategies and tools operationalized in the environment to build community and support teaching and learning. When I began thinking about these issues, I approached the design of new culturally-grounded

curricular strategies and tools inspired by the talking drums as an opportunity that could positively transform *all* children's early literacy experiences in-school or at home. Consequently, I mostly played a facilitator role during the sessions, providing the instruments and modelling along with general instructions but mostly leaving the work with the children to the parents while I handled other facilitation and research functions, like modelling play, keeping time, preparing the next activity, setting or checking the recorder/camera etc.... I remained available for providing advice or guidance. This allowed for the community to operate more or less the way it would normally, with me being more of a guest teaching-artist than a formal instructor. In this sense, I left a great deal of the room management to the parents themselves.

My choice to be involved in every aspect of the research (from formative stages to implementation) is informed by this positionality as a participatory action researcher of literacy, language, culture and technology. As such, I am very much interested in how individual and community and technology development efforts in schools or community-based programs are impacted by the kind of cultural knowledge and tools available in the environment and the types of structures that are put in place to help people create new meaning and possibilities for knowing. In particular, one of my research interest about human development is how drumming, as an embodied form of transmission and a traditional *way of knowing* relates to the needs for literacy skills acquisition and socioemotional development of young children. In such a research program, the questions I am posing concern the interactive relationship between learners and teachers (e.g., parents and children), language modes (e.g., visual, aural or embodied) and the communication tools (like the pen or the drum, e.g.) used by diverse communities and cultures to socially construct knowledge or transmit memory. Interactive multimodal learning tools (like video or online games) are increasingly used to mediate learning in various contexts, however there are still few examples of games explicitly grounded in trans-African cultural practices. In fact, the video gaming industry is the largest entertainment industry with even more discrepancy than film in terms of diversity and multicultural representation. While African Americans make up a significant demographic of video gamers (the 2nd largest ethnic group to play, after Asian Americans) there is a paucity of African Americans in the industry, with only 2.5% game developers of color (Lynn, 2016 ¶ 1). I view the opportunity of designing a learning game as a contribution to the field in terms of what other cultural paradigms may have to offer in terms of learning game narrative, mechanics, dynamics or aesthetics.

Chapter 4 – Background and Context Leading up to the Dissertation Study

Initial attempts to see potential impacts of the *Drumball-AlphaRiddims* technologies were tried in a few different informal cultural settings to both iterate the concept itself and to give some direction on what might be some of the most viable ways to implement the instrument in the actual dissertation study. More transformation in the design of the instrument occurred as a result of what I learned in this process than in the intervals between the sessions of the focal study. A description of how the apparatus came to be and the resulting design foci identified in the process is therefore necessary to fully illuminate the analysis and findings of the study, which I will present in Chapters 5 and 6. This chapter traces the chronology of activities and events that contributed to the evolving design and focus of the present dissertation study. First, I begin with the theoretical and conceptual spaces out of which the *Drumball* design and research questions emerged. Next, I provide an overview of the purpose and process of the formative research, followed by a discussion of the insights gathered through the trial runs of the workshop, and how these informed the direction and shape of the dissertation study.

Chronology

Ideation Stage: Theoretical and Conceptual Space

2011/12: Tangible User Interfaces / Urban Education Courses

Prototyping/Reformulation Stage: Iterative Phases of Formative Research – Trial Run Cycles

2014: Urban Griot Workshop Trial Run #1 & 2

2015-18: Participatory Action Design Research

2019: Urban Griot Workshop Trial Run #3

Implementation Stage: Study

November 2019: Urban Griots Playground workshop

Ideation Stage: Theoretical and Conceptual Space

Exploring Rhythm as a Mode of Information Organization & Retrieval in Hypermedia Systems

Tangible User Interfaces: Digital Orality Hypermedia System

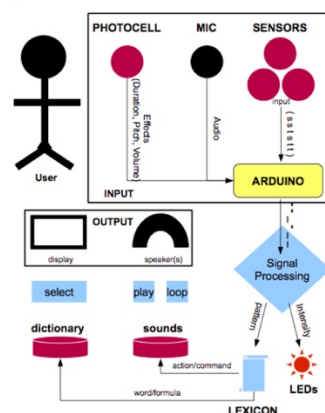
From its earliest inception in a course on Tangible User Interfaces taught by Professor Ryokai at the School of Information at UC Berkeley in 2011, the *Drumball* was conceptualized as a haptic interface to communicate via rhythm that could be used by adults and children with no prior knowledge of drumming. The device would act as a transducer of rhythm patterns into iconic and acoustic output, thereby providing anyone with the motor ability to tap ambidextrously with a rhythmic interface for communication. At this stage, the focus was not on the early literacy applications of the research. Rather, by taking rhythm as a broad concept that spans many areas of definition and applying it to the design of modern tangible user interface technologies (noting that communication via keypad interfaces uses *arrhythmic* tapping of characters spatially, and thus visually, organized), the first goal of this design research project

was more primarily to explore the aural and embodied experiences of rhythmic computing, and what affordances they could provide.

One early application of this idea was to model the user interface as a haptic hypermedia information system that a user could browse/retrieve data from using specific rhythmic commands via a *DrumBall*. This yielded various interesting considerations as players could 'call up', 'respond to' or annotate each other's stories by inputting patterns based on rhythmic codes. Thus conceived as a technology-enhanced extension of the traditional talking drum such that hand rhythms played on it are transformed into digital data, the *Drumball* would communicate a full range of meanings as the rhythms would essentially be utilized as a kind of Morse code. A critical piece of the design is the algorithm employed for recognizing the *Alphariddims* encoding scheme based on a 4-beat pattern consisting of a combination of tone (.), base (x) and slap (-) sounds. As these rhythmic patterns are musical enough to be learned by anyone, the technical focus of the research was not on the material-hardware components, but rather on this algorithmic-software HCI component through which rhythmic structures get translated into linguistic elements (represented as sound/visual output), allowing the user to interact with the system and others (online and f2f). Some of the deepest questions driving the research emerged at this embryo stage, and centered on the potential impacts of such a re-coding of drum language. In other words, *what if information systems users were able to 'drum' rhythmic patterns as input commands/signs instead of typing them? What opportunities in HCI (and literacy) would such a paradigm bear in an orality-grounded historical and cultural communicative context, like in Western Africa where the talking drum is still in use as an effective speech surrogate? What cultural, educational and epistemological shifts would a rhythmic (versus an alphabetic) representation of language bring to interface design?*

Figure 13 – Early input model and interactive prototype of the *Drumball*

input model



Urban Education: Design Challenge

In parallel to this Tangible User Interface design course at the School of Information, I was enrolled in an Urban Education course at the Graduate School of Education taught by my faculty advisor, Professor Mahiri, who contributed to guiding the early literacy educational applications of the research predicated on the *Drumball*. In it, a design thinking challenge

assignment focused on knowledge systems, tools and pedagogical strategies used in urban schools and how educators can come to approach students through the lens of the myriad experiences and resources they bring with them (which are constantly expanded and augmented by new multi-modal ways of accessing knowledge).

Motivated by a desire to reduce racial disparities in opportunity, I began investigating the empathic question of *what would be useful* in contributing to the academic motivation (thereby fueling the later success) of our nation's most under-served, marginalized and at-risk students. It was this exploration into the potential of the deeper cultural and embodied practices used for facilitating learning (like oral transmission and drum language in trans-African communities) that led to the consideration of designing a pedagogical framework for culturally-grounded embodied learning through voice, rhythm and movement that would center on drumming and could motivate otherwise disengaged students to participate and develop skills in order to acquire skills like the alphabet, build vocabulary and interact with others. Consequently, the *DrumBall* research was reconceptualized to focus on such a context of emergent literacy through oral and performative modalities in a hybridized (face-to-face and online) drum language learning setting. By observing the dynamic relationships and experiential aspects of oral and drum communications (e.g., call-and-response), the system is intended to provide a multi-modal interface that supports drummed, verbal, textual and visual communications and thereby increases the number of back-and-forth opportunities for children to manipulate sounds, read symbols and letters, count numbers and build vocabulary. This design departs from the individualized learning mode based on visual print and books to explore the practice of drum language multimodal expression as a social context for developing literacy skills by integrating content across a wide range of subject areas: geography, music, reading, technology, history, drama.

My design thinking approach to this challenge built on the cultural anthropological perspective described in the literature review on the relationship of drums to orality and intended to produce a new framework to inform the development of rhythm-based learning games and teaching strategies, noting that:

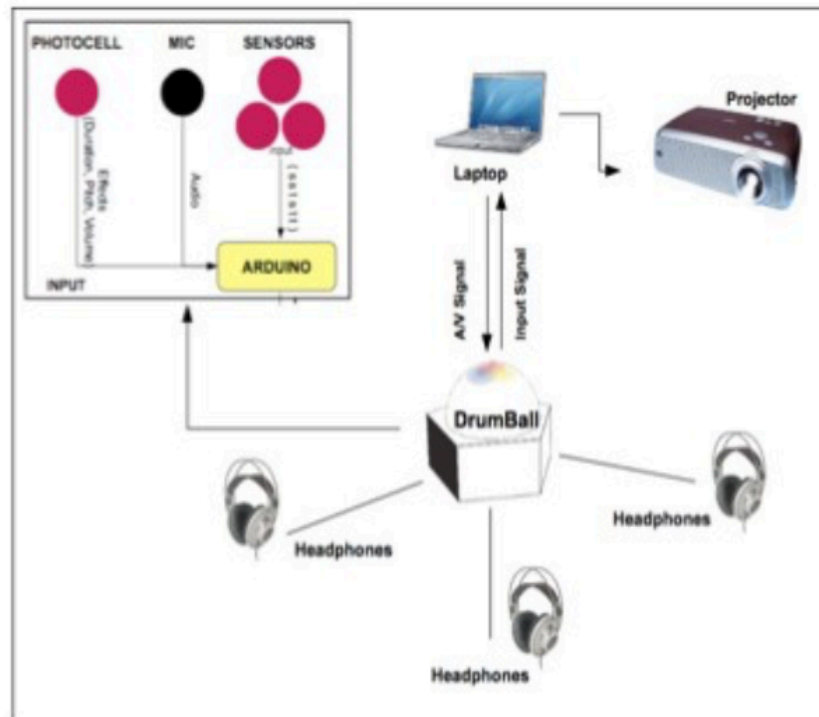
1. communication via conventional (computers or phones) keypad interfaces uses (mostly) arrhythmic, alphabetic tapping
2. the integration and application of rhythm to modern technologies could augment learners' experience of computer-mediated communications
3. the principles of drum-based languages are less matters of learning how to make music than a matter of learning to hear and think about one's language in a new way, and therefore could re-set the foundation for the way we think about communication across learning contexts

The ideation phase was conducted as a series of lo-fidelity (paper-based) and interactive prototypes which led to an ecology of activities, settings and tools to synchronize the aural, visual and textual meaning-making contexts resonant with oral cultures. This phase yielded several interesting options. Through the exploration of spherical geometry (as in a drum circle), one of the early design goals was to provide a multidimensional surface that caters for multiple interactions and that encourages the participation of several learners operating through several modes, or *semiotic domains* (speech, gesture, rhythm, visual). This design model provided

opportunities for its use in an educational setting (in or after-school) that would promote group communication, multimodal learning, and embodied expression among teachers and learners. In the same way that in the West African drum ensemble ritual activity “the master drum projects a succession of intriguing, logically ordered rhythmic manipulation which are concurrently regulated by the common timing principle” (Anku, 2000:2), a groups of 2 or more users interacting via the system engage in a continuously evolving call-and-response game/exchange (across space and/or time) consisting of words, sounds and images of life, as they take turns speaking or drumming letters, words, phrases, overlaying and manipulating sounds, visualizations as well as other digital artifacts, thus creating elaborate drum-oral texts.

One important result of this design consideration is that multiple users can have equitable entry points to participate. This circle organization is important (logistically, and epistemologically) because assigning and controlling students' physical movements in school is usually one of the main ways that teachers regulate learning spaces. Rather than breaking the focus of students' attention away from each other towards the board, teacher or screen, the resulting affordance of the design is determined by this inclusiveness for a collaborative mode of communication, interaction and play, using a variety of rhythm-mediating tools like the drum, one's body or the *Alphariddims* app.

Figure 14 – Ideation sketch of the *DrumBall* embodied learning environment



Purpose of the Formative Research

The formative research conducted over a period of several years consisted of several trial runs of the workshop with different sets of participants (ages 2 and up) engaging with the early prototype of the *Drumball-Alphariddims* system. This participatory design research process focused on how to prototype a digital talking drum system inspired by trans-African cultural systems and adapted to early childhood learning conditions. My aim with the trial runs was to probe people's thinking around rhythm and explore what they know about the communicative properties of rhythm that has potential to be extended towards supporting the development of early literacy and socio-emotional skills of children through rhythmic activities involving oral communication, music, dance and technology use. This series of test-runs of the workshop conducted over the course of several years with various sets of children (including artists, parents, teachers and guest presenters) provided many opportunities for engaging the thinking of learners from preschool to college (and the field at large) around the early literacy application of the *Drumball-Alphariddims* design concept. Looking back on the literature review process, I trace the original inspiration of the *Drumball-Alphariddims* innovation not only to the traditional talking drums but also to prior educational technology research in applied psychology related to embodied modalities (oral language, gesture), as well as music and comparative media studies. For example, Cassell (2004) describes how "non-screen-and-keyboard-based technologies that listen to children can be used to support their emergent literacy behaviors and have an effect on their subsequent writing skills" (75). The Jam-O-Drum Interactive Music System developed at Interval Research Corporation where up to six simultaneous players are able to participate in a collaborative approach to musical improvisation" also provided an inspiring direction in that "the system embraces both the novice and musically trained participants by taking advantage of their intuitive abilities and social interaction skills" (Blaine, Perkins 1998:1). The system furthermore demonstrates educational applications by virtue of its call and response mechanism that would inspire "follow the leader" behavior through the orchestration of rhythmic and visual patterns, and integrates "the community drum circle as a metaphor to guide the form and content of the work" (1). While none of these prior works fully capture the unique features of the *Drumball*, they played important roles in grounding its conceptualization and the literacy theory surrounding its pedagogical applications.

Through this process, the *Urban Griot Playground* workshop model (i.e., the learning ecology, including both curriculum and tools) was refined as a context of research for studying early literacy acquisition. The *Urban Griot Playground* intervention workshop model builds from these theoretical and design spaces and in light of early childhood standards to propose a dynamic framework that engages children and parents to create and share together through voice, rhythm and movement activities. This pedagogical framework for culturally-grounded embodied learning is designed to be responsive to the (Pre-)Kindergarten Literacy and Music/Dance standards. A review of the Visual and Performing Arts Content Standards for California Public Schools adopted by the California State Board of Education reflected the following knowledge areas and skills to align the curriculum with:

1. Artistic Perception
 - a. Use icons to represent sounds and ideas
 - b. Identify the sources of sounds
 - c. Use movement to respond to tempo/dynamics

2. Creative Expression
 - a. Use body percussion
 - b. Use voice and instruments
3. Historical-Cultural Context
 - a. Build a vocabulary of music/dance from around the world
 - b. Use movement in response to music
4. Aesthetic Valuing
 - a. Describe what is seen, including both literal and expressive content
5. Connections, Relationships, Applications
 - a. Use music, together with dance, theater, and the visual arts, for storytelling

Formative Research Process

My methodology throughout the formative research period (which spanned over several years and across many institutions) was to employ an iterative process of ideation and reformulation to try to find what are ways that we can design embodied learning environments grounded in embodied rhythmic communication practices to benefit the emergent multimodal literacy needs of young children. Given my goal to understand the meaning (both objective and subjective) various kinds of people make of their communication experience via drums (rhythm-as-text), and what import (if any) this knowledge can bring to bear in the urban American educational context (in terms of teachers' practice and students' cognitive and social development at home and in the community) this choice of methodology seemed adequate. The participatory design research approach is representative of the direction my research will take moving forward.

Participatory Design Research

I asked experts in the fields of literacy, music and human-computer interaction (HCI) *what are the best practices for designing interactive rhythm-mediated artifacts for children*, also sharing with them iterative versions of my evolving prototypes (both the *Drumball* device and *Alphariddims* application). I also talked to technologists across three different domains and HCI experiences (user interface/user experience, interactive media, computer science/artificial intelligence). This design advisory circle provided useful resources, advice and insights on how to make better interactive game artifacts for children, highlighting core principles like story, mechanics, play experience/engagement (how to invite and sustain play) as well as aesthetics (physicality of the device, physics of the game, audiovisual cues).

From this survey of experts, the preliminary design recommendations that emerged were:

1. **Focus on the story** (core narrative) anchoring the user interaction: this presented the option between a) an incremental approach grounded in developmental theory starting with learning the basic drum sounds and symbols before introducing *Alphariddims* to produce letters, spell words and construct phrases and b) an immersive approach focused more on directly introducing drum vocabulary and messages as rhythms to be explored. In the long run, the immersive approach will be favored in light of the social and emotional opportunities it offers by providing reward, excitement and inviting participation. In contrast, the narrative based on an incremental approach is experienced as a bit more restrictive, probably due to the fact that it is based on the

internal structure of the alphabet, which has its own progression in terms of how content is introduced.

2. **Integrate cultural framework** by building on the traditional practice of drum language: This design principle was pursued by explicitly embedding cultural referents at the level of the mechanics, dynamics and aesthetics of the main game frame.
3. **Tend to both developmental and social (“fun”) outcomes** of the child experience: given the hybridity of the *Drumball-Alphariddims* system as both a social innovation (game grounded in the sociocultural and historical practice of drumming) and technological innovation (learning tool informed by theories of literacy and multimodality), a fine balance had to be struck in the design process between the emotional enjoyment of users playing the game and the learning outcomes in focus by my research question on the *contributions of this approach for children’s aural/visual literacy skills related to letter naming and picture naming as well as their family relations* (how this approach offer families an alternate mode of experiencing reading and writing).

The design team also assessed the fun and educational features of the prototype app, providing feedback for additions and modifications to the system as it evolved through several iterations. I asked them to suggest improvements and brainstorm new ideas. During this process, people proposed a range of programming (behind-the-scenes) and interactive (user-facing) features such as landing scene, tutorial, score leaderboard, interaction script, validation and celebration, to name a few. Much discussion centered on how choices of user actions should preserve the flow of call-and-response experience, while providing enough freedom for a child to explore the game space autonomously (tutorials, levels, practice/play modes).

Focus on the story: Narrative script

Thinking about how one might learn with a human teacher, the incremental approach breaks the games into levels with the “beginner” level consisting of learning one alphariddim at a time. The system thus plays the role of the teacher managing the “back and forth” or call-and-response between the player and the game. The following excerpt captures this flow and provides a mock game narrative script obtained from an early email exchange with one of the design team members:

“Have one letter and the rhythm dots show with instructions “Tap according to the pattern, big circle is B little circle is S”? And then whenever the person taps, the big or little circles show up .*.*. and have some feedback based on how they are tapping. Maybe they only have space for four taps, or maybe you let them tap out continuously but the system picks out “successful” rhythms that match. So if they use the wrong letters, someone says “Try these letters.” or if a different letter is tapped out that pattern they tapped highlighted {*.X} and the person say “U but we want X” and then play the sound of X. That way, it’s more like the interaction you’d have with a teacher. Anyway, you could show the person when they’ve learned all the letters of a word, or even if they have learned all the letters of the alphabet on repeat plays.

Like the first time they play, they try to get the letters of “HOPE” and then the next time they play they get ‘BIRD’, so their status for that game is they have 8 letters out of 26.

Game: Hey, tap out U (oo.X) tell them what keys to push, too.

Player: oslxo (taps are shown on the screen what is tapped, with detected rhythms 61ord61ighted”

Game: Haha, that was “B”, try it this way (whatever pattern B is)

Player: tries again

Game: AH, too fast or too slow. Try it this way (echoes what pattern they should do)

Player: tries again

Game: “U” (pattern) Aha, you got it (or some encouraging thing) Okay, next letter.

Player: tries next letter until they’ve spelled out all the 61ord

Game: You’ve got “HOPE” (plays whole pattern). Now you try!

Player: plays the whole word? Maybe when they do it right, some feedback “Yeah”

Game: plays “HOPE” together with Player. Then they have the option to play next word or quit? Show them the alphabet they’ve learned.

Integrating cultural framework: Drumball pad core feature

The *DrumBall* design is based on 3 sensors as an analogy to the tone-slap-base drumming principles and techniques of the djembe drum. This is the main area of interaction for the user as it imitates an actual djembe drum which at its most basic level of play offers the three sounds tone (·), slap (–) and base (x) (see Figure 15). As the principles of drum language involve specific hand-drumming techniques, one aspect of children’s experience with the system is the ability to learn proper rhythm codes and hand-based gestures as a mode of communication.

Figure 15 - Hand-playing technique consists of slap-tone-base strike combinations, modeled after the *djembe* drum principles

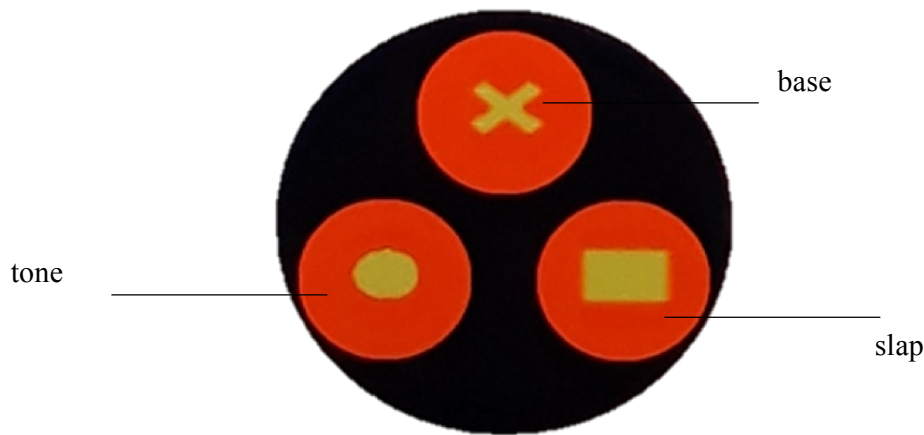


When it comes to the design, experience and evaluation of games, the Mechanics, Dynamics and Aesthetics (MDA) framework provides a helpful set of lenses for looking different facets of the game, of which the designer and the player have opposing perspectives (Hunicke, R., LeBlanc M. & Zubek, R., 2004). From this perspective, games can be seen more as artifacts than media as their behavior builds via user interaction based on the possible actions made available by the designer. Attempting to ground the game design in the experience of call-and-response practices (mediated by voice, rhythm or movement), I made several passes at fine-tuning the various game components (rules, run-time behavior, feedback) to provide listening, reading, speaking and writing opportunities. As a result, the core experience of the application

(both web and mobile versions) is inspired by aspects of the organization of space, community and resources in traditional cultural spaces rich in clapping, rhythm, movement, call and response, oral transmission and follow-the-leader process.

The core features, actions, components and dynamics of a drum language learning activity began to emerge from this process leading to the conceptualization of the game as an obstacle course through a telematic space wherein a character can access different levels of content using a drum pad to win drum quests: challenges of varying degrees consisting of completing the letters, words and phrases in the story by way of their rhythmic patterns made of 3 distinct sounds (tone, slap, base).

Figure 16 – *Drumball* pad is the main area of interaction for the user



As the only input feature of the system, the *Drumball* pad is grounded in the *djembe* drum principle of tone, slap and base, and serve as the user interface for the rhythm-to-text transduction. When using a keyboard, the symbols are mapped to specific keys. Several iterations of these mappings were made and evaluated by the design team, considering proximity (base: A, slap: S; tone: D), distance (base: A, slap: L; tone: B) and orientation (base: C, slap: N; tone: G). The last mapping was settled upon as a satisfactory solution for preserving the visual orientation of the *Drumball* pad. In this way, children explore writing by using the *Alphariddims* visual symbol system in order to produce alphabet letters as four-beat combinations of tone, slap and base sounds.

Table 3 – *Alphariddims* Code Table [Tone: ●; Slap: -, Bass: X]

A: ●-XX	N: -●XX
B: -●●●	O: ---X
C: -●-●	P: ●-●-
D: -●●X	Q: --●-
E: ●XXX	R: ●-●X
F: ●●-●	S: ●●●X
G: --●X	T: -XXX
H: ●●●●	U: ●●-X
I: ●●XX	V: ●●●-
J: ●---	W: ●--X
K: -●-X	X: -●●-
L: ●-●●	Y: -●--
M: --XX	Z: --●●
!: ●--●	?: ●●--

Tend to both developmental and social outcomes:

Many educational games are available on mobile platforms (like iPad or Android tablets) whose size, weight and portability make very easy to use, especially for the hands of a young child. Consequently, rather than pursuing the tangible side of the research connected to the *Drumball* device itself, the decision was made to tend to both developmental and social outcomes by focusing on making the experience of a digital drum talk learning game available in the most efficient way. This led to an exploration of the prototype application first programmed in Processing and subsequently in Unity. Future iterations of the design will focus on the tangible/wearable interface.

Processing

Processing is a flexible software sketchbook and visual programming language available in Java, Javascript and Python modes. *Alphariddims* is an alphabet learning app using a Morse code-like scheme to produce letters through various 4-beat drum tone combinations. By associating the concept of four-ness to the action of producing a letter, this activity connects literacy with numeracy as each letter is generated from a rhythm of exactly 4 beats.

Figure 17 – Early prototype of *Alphariddims* screen depicting the code for the letter ‘P’ (· – · –)

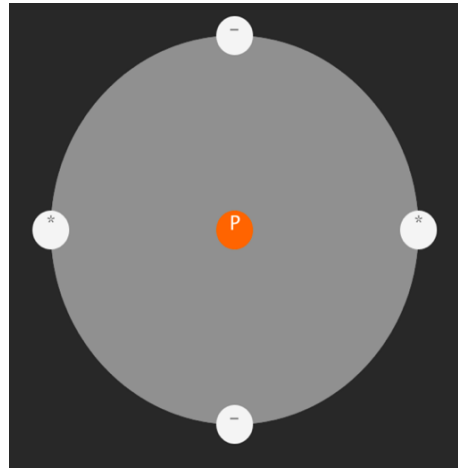


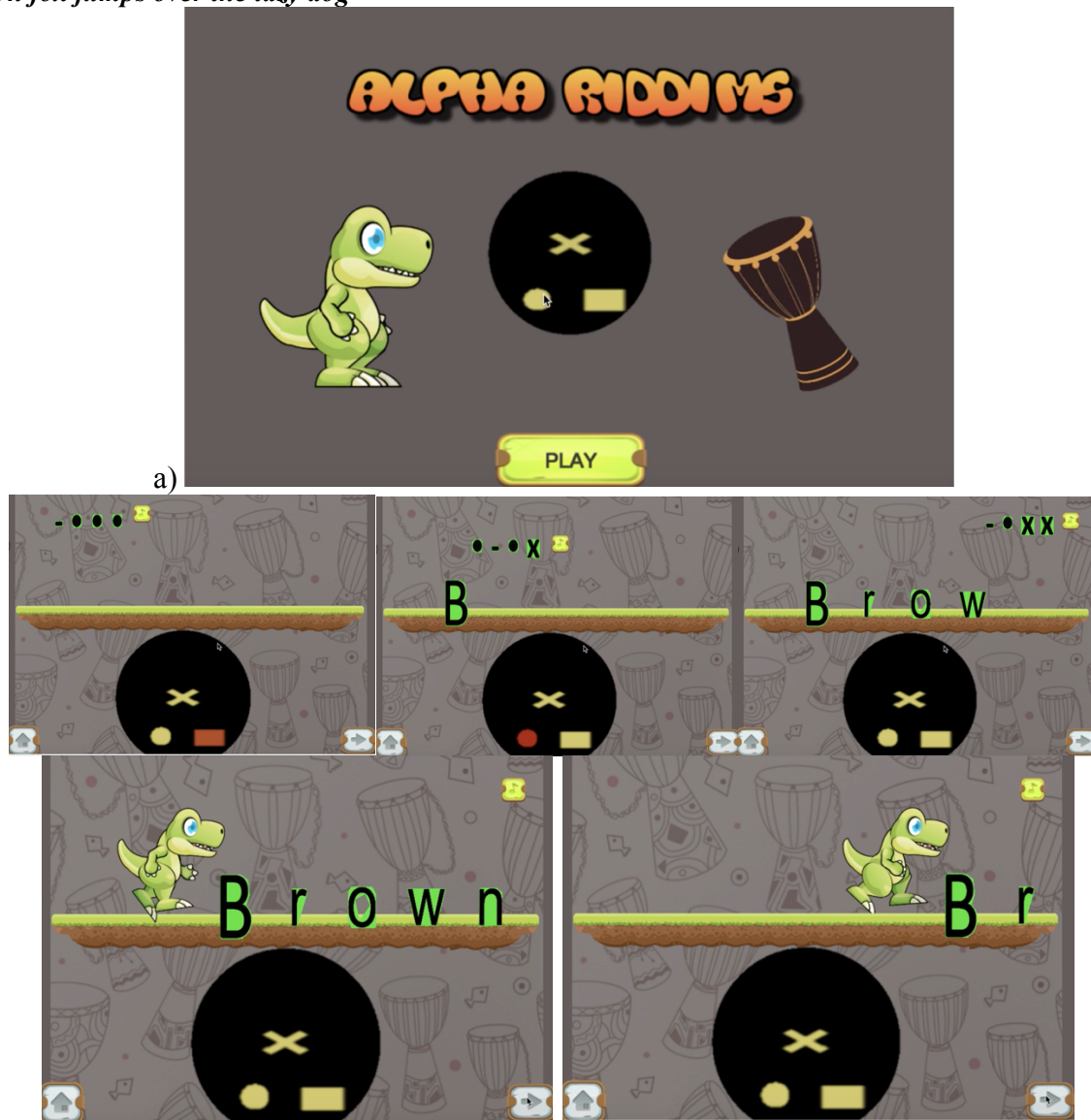
Figure 18 – a) Version focused on alphabet letters and b) Version focused on name spelling



Unity

Unity is a real-time development platform for 2D, 3D, AR & VR games. Unlike the Processing version which requires an Android tablet or mobile phone, the Unity version is cross-platform compatible, including a WebGL build allowing users to access the game from a browser. It also provides more animation and interactivity features, being a full-scale game development engine.

Figure 19 – a) Intermediate and b) final version of the game focused on spelling the pangram “*quick brown fox jumps over the lazy dog*”





Prototyping/Reformulating Stage - Iterative Phases of Formative Research

Prototyping of the web/mobile versions of the app began in Spring 2015 and went through several cycles of iteration illustrated above that were aimed at integrating the recommendations of the design team, as well as the lessons, insights and observations collected through the participatory design research. The question of *how children perceive rhythm and apply this rhythmic knowledge as information to accomplish various tasks* has import on the approaches, strategies and theories used by teachers and parents in the context of everyday teaching and learning as rhythm can fulfill many of the communicative, mnemonic and social functions of writing. This, in turn, could lead to new approaches to language learning; alternatives to the conventional alphabetic communication system.

Trial Run Cycles

Drum Language: Probing People's Perception and Thinking around Rhythm as a Mode at the Urban Griots Salon #1 (Oakland, 2015)

The first trial run of the workshop was modeled after a media salon was held at a green youth arts & media center in Oakland, CA. The salon, presented by the *Urban Griots Collaborative*, was an all-ages space for teens, creative artists of all genres and walks, parents, children, and educators, to engage in critical discussions on or interactive experiences mediated by arts, digital media and technology. I started by sharing with them a couple of video on drum language (proverbs and poems) to give a bit of background on this mode of communication for those who were not familiar. Next, I facilitated a workshop activity for participants to engage hands-on with the tools followed by a focus group discussion on questions probing their thinking around rhythm as a mode.

Given the small number of participants in attendance in the inaugural salon (3 adults), this research focus group consisted in everyone sharing with me and each other their thoughts on the audio/video materials presented. When asked the open-ended question *in what ways can drums be said to be talking?* to get at his perception on drumming as a form of communication, one of the research participant, an artist and musician, spoke on the conversation-like quality of drums when played in call and response: *"To me what that means is when you, when someone plays a rhythm and someone else plays a response back. So that's kinda, like a whole conversation is happening with the drum."* Another participant spoke at length on this question explaining that in the context of dance drumming, the drum is really seen as signaling to the dancers, at times accompanying, at times instructing the dance, through specific rhythms, changes, calls, etc. It is in this sense that, in his professional opinion, rhythm could be viewed as a communicative device between the drummers and the dancers, and among the drummers themselves. Yet another participant had little prior knowledge with respect to the drum being used to communicate, nonetheless she had an insightful response to the question of whether or not drum, drumming, drum language and drum communication (those practices, their principles and techniques, in general) have any value and benefit in the context of schooling and education:

"School is definitely a place where we should learn to communicate. I feel like art in itself is not only a benefit, that could benefit the school and the education, it's a necessity. Art in different form. And it's interesting because I just did that workshop on circle singing, so it's like, there's drum circle and circle singing. Use your voice and we don't say any lyrics neither. It's like

improvisation, and people keep sharing their experience about how healing it is, how helpful it is in their lives and within their community, how much they learn when they gather and sing together. In the same way, I feel the drum will have the same, it's different, but the same necessity of today. We're at the top of technology communication with the social media and all that, phone and you can see people even like on screen and talk to. I feel like we are in a big lack of communication, face to face."

Alphariddims: Investigating Children's Multimodal Meaning-Making through Digital Drum Talk

In a second trial run, I began to observe and collect audio/video data of a mother and child's experience in the context of a computer-mediated rhythmic communication activity using a prototype of the *AlphaRiddims*. Sample cards with each letter of the alphabet mapped to a pattern of 4-beat combinations of 3 symbols (•: tone; - slap; x: base) were provided to participants as a guide for interacting with the system. My purpose in having a mother and child as participants in this session was related to my research interest on the impacts of culturally-grounded, embodied learning environments and activities mediated by the Urban Griots approach to multimodal experiences on children's development of literacy behaviors and socio-emotional skills, in particular with respect to parent/child interactions in learning a new system that could inform the future *Urban Griots Playground* study. As it is commonplace for children to intone or play rhythms before learning how to speak their first words, let alone write or type them. I wanted to explore this intuitive embodied sense of rhythm we observe in children as a point of departure for the design of new learning experiences and tools. My analysis looked at the mother-child interaction as a context for understanding their intuition and thinking around how the *AlphaRiddims* tool works. User input for the prototype version available at this time was keyboard-based as explained in this short passage revealing several interesting facts about the mother's initial thinking:

Figure 20 - Mother and Child using the *AlphaRiddims* tool at the *Urban Griots Salon* (Oakland, 2015)



Excerpt #3

PT: Do you understand what's going on?

Do you see what's going on?

So each letter is a 4-beat pattern.

Mom: Oh...

PT: So, K would be ... This is slap, tone and base (points to -, * and x respectively on the printed card in front of the screen). That's the meaning of the marks. So if you wanted to play this rhythm it would be slap, tone, slap, base.

Mom: A is slap?

PT: Slap is 'S'.

Mom: Ok

PT: And tone is 'A. D is base.

Mom: Ok... Oh I see, it's creating a pattern around it.

(AR taps the screen).. No no, **it's not touch screen baby**, it's right here...

PT: Oh right (laughs)

(Mother and child play... System outputs 'Y'... AR repeats 'Y'... System outputs 'C'... AR repeats 'C'...)

Mom: Yea, you see that? AR raises his hands in victory

You see that S, D, A... Say Tone, Slap..(AR hits 'P' system outputs wrong) Don't touch those.

Right here, A, S, D. (AR hits 'S').

'S'. That's slap. Press slap slap.

AR: One, Two, Three, Four (hits spacebar – wrong sound)

Mom: No, no, no. Press slap slap. Can you do the 'S' right here? Slap Slap.

(Guides his hand to each individual key.)

Slap Slap Tone Base (System output 'G')

That was G

(AR reaches over Mom's arm to the drumball interface and hits the tone pad repeatedly. System output 'H'. 'H'. 'H'.)

Mom: It's working now. Ok.

(AR raises his arms in victory again.)

Mom: I was like leaning on it for a second and it was making it work.

AR: I wanna do it again.

PT: You wanna do it again?

AR: Yeah

PT: Alright. Let's do it again.

Mom: And you created this?

PT: I'm working on it.

Mom: Oh wow...

(AR plays again with the keyboard)

PT: So 'K' would be slap tone slap b- uh oh-

Mom: That one doesn't work

(AR hits tone repeatedly to produce the letter 'H'.)

Mom: Alright... Oh oh oh oh...

(AR hits the 'J' key and gets the error sound)

Mom: Ah ah..

(AR hits the 'S' key once)

Mom: There you go
 (AR hits the A key twice and S one more time to produce the letter 'X')
 Mom: Yeah!!!
 PT: Good job!!
 Mom: High five buddy.
 (AR gives her a high five and goes right back to the keyboard)
 Mom: Alright... do it again, right here, right here.. 'A'.
 (AR presses the 'A' key)
 Mom: Yep.
 PT: 3 more sounds.
 Mom: Do three more sounds. Right there. Slap. Hit the 'S'. and then Base 'D'.
 AR: 'D' this? (points to the letter 'Z')
 Mom: D. D is base
 (System outputs A.)
 PT: Good job.
 AR: I wanna do it again. (jumps up and down)
 Mom: You wanna do it again?
 AR: Yea
 Mom: Ok, press 'A'.
 AR presses 'A'
 Mom: Good job. Press slap, 'S'.
 AR presses 'A'.
 Mom: That's.. That's tone.
 AR: That one?
 Mom: A is tone...
 AR presses 'Q'
 Mom: No, wrong. That's when it goes 'BRMMM' (wrong)
 (Mom presses Slap Slap Tone. System outputs 'U')
 AR: U... That one?
 Mom: No, just these. Right there.
 PT: How old is he?
 Mom: 2 and a half next month. On the 23rd of January, I mean June.
 PT: Wow. When did he start speaking?
 Mom: Mmm by by ten months. He started saying words.. 9 months he was saying ball, dog and dad.
 PT: ok
 Mom: and then by ten months
 (AR hits the number '2' and system outputs error sound)
 Mom: (to AR) Ain... Wrong! 'A'.. Good job. Yes, great. High five buddy.
 (AR punches her palm several times like a boxer)
 Mom: Alright, knocking them out, knocking them out, knocking them out. Boooooom!!
 Uh oh.. get up get up get up..
 (to PT) And then by 11 months, you know more words. Twelve months, Mommy.
 PT: Ok

Mom: Then hum, yea it was just words.. Coming. More and more words. And I played a lot of phonics, phonetic stuff for him

(AR presses 'A' several times creating a rhythm of tones. System keeps outputting 'H'.)

Mom: That one makes 'H'. You like that noise huh?

(AR runs to the djembe drum and starts playing.)

In this particular activity, the use of drumming was connected to both letters and numbers as the mental task that the child has to 'get right' in order to 'win the game' is to *produce one or more of 26 alphabet letters using a 4-beat rhythmic code based on a 3-sound system of tone, slap and base*. No instructions were provided at first, except for a few opening remarks on the *Drumball* being a new rhythmic communication interface under development. This exchange immediately follows her answer to AR's question on whether or not *AlphaRiddims* was a video game (*AR: It's a video game? Mom: Yes, it's a drumming game*) and the interaction is driven primarily by AR's own impressions, actions and questions (e.g., AR asking his mother to join him in the drumball activity). The explanation provided on the correspondence between the beat marks and the letter on the card and how to read and perform these *alphariddim* codes seems to open a window of understanding for the mother (which is later transferred to the child) as she expresses "*Oh I see, it's creating a pattern around it*". In context, the added information serves to clarify a key assumption of the "game", in that a letter is represented by a 4-beat rhythmic code, while each of three 'legal' sounds (tone, slap and base) is represented by a specific key on the keyboard ('D', 'S' and 'B'). Without this piece of knowledge, the mother and child's interactions were hitherto rather haphazard as they were both randomly pressing keys and unintentionally triggering alphabet letters (or causing the system to output the "WRONG" sound), which prompted to my asking the question "*Do you understand what's going on?*". Passed this point, the transcript provides evidence of a much more fluid and directed activity between the mother and child, as the goal of producing letters using a rhythm alphabet of 3 tones becomes clear.

Figure 21 – Alphariddim code for the letter 'A' (tone, slap, base, base)



AR's subsequent success once guidance is provided is indicative of his cognitive understanding as revealed by his body language and vocal expression of his enjoyment in the activity ("*I wanna do it again. (jumps up and down)*", *raises his arms in victory*). Also, by virtue of the nature of the activity, the mother's instructions and talk employs multiple symbol systems in various ways (keyboard letters standing for tone, slap and base sounds represented by icons, 4-beat combinations of these sounds standing as unique alphabet letters), which provides a context for the child to explore/learn/practice letter names and sounds by tinkering with the system:

Mom: Alright... do it again, right here, right here.. 'A'.

(AR presses the 'A' key)

Mom: Yep.

PT: 3 more sounds.

Mom: Do three more sounds. Right there. Slap. Hit the 'S'. and then Base 'D'.

AR: 'D' this? (points to the letter 'Z')

Mom: D. D is base

(System outputs A.)

By urging AR to “do three more sounds” after he has pressed the ‘A’ key once, the mother is walking him through a basic example of the operation of addition ($1 + 3 = 4$). This mathematical constraint (a total of 4 beats) is accompanied by the keyboard mapping function (let’s call it, F defined by the relations ‘A’ $\Rightarrow$ tone; ‘S’ $\Rightarrow$ slap; ‘D’ $\Rightarrow$ base, with every other key on the keyboard mapped to the error sound). These rules, although not explicitly formulated at the outset, once introduced, guide the mother and son’s activity in the *AlphaRiddims* ‘drumming game’, resulting in a less random, more directed thinking process in AR, as exemplified by his question “‘D’ this?” while pointing at the ‘Z’ key. This question is indicative of the confusion many children encounter in distinguishing letters that sound similar but have different visual representations (‘Z’ and ‘D’). At this stage, AR has stopped randomly tapping of keys that produced numerous WRONG sounds at first, and understands that in order to ‘win’ (i.e. producing a letter sound as the system output, like ‘H’), he must not press just *any* key, but only those in a set of *legal* keys. By verifying whether the ‘D’ key is one of those belonging to the set of legal characters, AR is demonstrating an understanding of the rules, which build on mathematical concepts like sets, permutations, map functions or counting.

In conclusion, use of the system not only reveals aspects of children’s thinking around the oral production and visual recognition of alphabet letters, but also provides opportunities for them to practice some fundamental concepts of literacy, e.g. that sounds can be represented by visual symbols ($\bullet - x$) which can be associated (or mapped) to other symbols (“*Right there. Slap. Hit the 'S'. and then Base 'D'.*”); that visual symbols are read from left to right and hold a fixed position in a string of characters that can be counted (“*Do three more sounds*”) and that digital or manual manipulation changes the shape of visual objects and therefore their corresponding sound form and meaning in a given context (“*D is base*”). This ability to play with symbol systems and make semiotic connections between them is a fundamental cognitive skill of literate individuals.

*Fine-tuning the UGP Workshop Model and Approach to Multimodal Literacy
at the Urban Griots Playground Mock Sessions (Oakland, 2019)*

With this preliminary infrastructure in place, and once the Institution Review Board had approved the study in December 2018, a final workshop trial run was conducted in Oakland during the Spring of 2019 to gain lessons that would inform the recruitment strategies, site requirements, workshop layout, technology infrastructure, learning activities and instructional strategies to be used in the actual *Urban Griots Playground* study. My aim was to improve the quality of the research and the effectiveness of the study implementation by testing out the procedures, instruments and other management issues. This took place at a Dance Center in Oakland and involved a parent-teacher (and her teaching assistant) with a pre-school classroom of 8-10 children ages 3-5 (depending on the session). There were a total of 3 sessions, one held at the preschool and two held at the Center, after attempting to host an Open House to meet more of

the parents in order to enlist them in participating in the family workshop. As it was not feasible to get buy-in from all parents, in the end, I had to change/tweak the idea of a family workshop to work with this group of children.

The first phase thus involved securing consent from the other parents via the parent-teacher. Next, the child entry skills inventory survey questionnaire data was collected by circulating a link to all the parents via the parent-teacher. Feedback at this stage helped to fine-tune the wording and order of the questions, as well as the unit used on certain items. For example, asking for age in months was a bit challenging for most parents because most stop counting in months after about 1.5-2 years, and just think in years. So, instead I asked for parents for month and year of birth only and did the conversion to months myself. Also, it was suggested that for some of the queries (like music or sports, for example) giving multiple options by listing a number of genres (e.g. Hip-hop, jazz, classical, pop etc.), including an “other” category, then asking for parents to give two or three artists the children like might lead to better accuracy and more information rather than open ended question.

Finally, as it was not possible to obtain all the parents’ contact information, the parent-teacher was informally interviewed at the school, which helped to refine the administration and contents of the protocol. To help facilitate the sessions, given that all parents would not be present to assist children in the various workshop tasks, a workbook was given to the parent/teacher to prepare for the sessions in her regular classroom. The activities presented in this workbook are organized in two levels of stages (0, 1 and 2, 3), according to their increasing difficulty in vocabulary and of the drum language mode used (alphariddims and syllables, respectively). Level A (stages 0 and 1) were designed with dance and music standards in mind for prekindergarten children, who must also give great attention to Level B’s language focus (2 and 3). Finally, the stages in the workbook corresponded to specific modules on the website (see Appendix):

LEVEL A

Stage 0:

DRUM SOUNDS
ALPHARIDDIMS

Stage 1:

DRUM NAMES
SCRATCH DANCE

LEVEL B

Stage 2:

APPELLATIONS
PROVERBS

Stage 3:

PRAISE POEMS

Conversations with the Art Center Coordinator were also undertaken. These were conducted face-to-face at the Center in the space where the workshops were to take place, and provided the advantage that he could discuss issues that he viewed as important (like the use of mats and colored floor discs, access to musical instruments and equipment, snack breaks), given his experience in coordinating similar activities at the Center and nearby schools. These meetings resulted in a floor plan and schedule template intended to guide the implementation of the sessions.

Figure 22 – Urban Griots Playground mock session (Oakland, CA)



Video documentation of the sessions was important for two main reasons: (1) in order to study my own effectiveness in presenting the concepts and facilitating the activities, and (2) to refine the instructional material and identify space and time management issues to be aware of for participants in the main study. In addition, reflection notes taken after every session (like the following excerpt recapping the Day 1 session) allowed me to make note of the particular kinds of issues that should be ironed out for the main study:

“The group arrived at 2pm. 10 floor discs were set up in a circle to mark sitting spaces for everyone. Before taking their place, the children were asked for their assent by reading the script (from memory). After they all agreed, the children took their shoes off and took their seat, laying down flat on the floor with knees raised. Walked them through a chi-flow /stretching sequence calling out different parts of the body. I forgot to turn on the music to have a warm-up capoeira activity, and jumped straight into the recap from last week (zip-zap-zop, tone-slap-base) and had the group play in synchrony for a while. They had a hard time understanding the process so an actual ball might be good to concretize the activity for them. I need to improve my method with this segment as it felt pretty dry and the children easily got confused in terms of (1) the meaning of the symbols () and (2) their correspondence to the drum sounds (tone, slap, base). I also forgot to introduce the decks properly by explaining to them that they will get these to take home but that for now we’re just going to use the first letter of each of their first names and:

- 1) go around the circle and each play the alfariddim for their first initial with the group repeating in call-and-response*
- 2) have each of them come up with a dance step embodying the rhythm for their first initial. They will get a chance to work in small groups with the help of a teacher and create a Scratch dance animation from our digital corner based on these moves*
- 3) play a game of Alfariddims on the computer to spell out names of different animals/objects*

The results revealed the importance of having parents or adults present who could work 1-on-1 with the children for some activities. In this set of sessions, there were 3 adults present, myself and the two teachers, both of whom seemed to see their role more as focused on management of the children's behavior rather than active participation in the tasks alongside them. It was also found by talking to the teacher that although the children enjoyed the activities and took up to the embodied modes of play used in the workshop, the duration was too long for their attention span and the order to strike a better match between the level of the students, the content covered and the choice of wording.

These formative research experiences provided useful opportunities for experimentation with developing the digital and informed the design of the curricular plans, tools and strategies to be used in the *Urban Griots Playground* study investigating the potential of drumming as a viable bridging context for encouraging literacy behaviors and socioemotional development. From the beginning of this process, I wanted to understand how rhythm-based activities could serve to bridge young learners' acquisition of various multimodal literacy skills (listening, speaking, reading and writing) through the design of both old and new communicative tools and applications (drums and *Drumball*). The participatory design activities helped a great deal in this respect. In practical terms, the process pointed me to a new orientation towards the design of embodied learning environments and experiences that leverage the kinesthetic, communicative and mnemonic functions of rhythm as a mode of human-human and human-computer interaction to stimulate literacy skills in children.

Chapter 5 – Findings on the Scaffolding of Early Literacy Acquisition through Drum Talk Across Face-to-Face and Digital Contexts

This study examined cultural activities and digitally-mediated processes associated with the development of literacy and social skills of children in the context of a family workshop series named the *Urban Griots Playground* (UGP) that engaged children and their parents to practice and play together through multimodal call-and-response embodied learning activities using voice, rhythm and movement. Chapter 1 introduced the research questions addressed by the study:

1. What are the impacts of culturally-grounded, embodied learning environments and activities using the *Drumball* and *Alphariddims* mediated in the *Urban Griots Playground* approach to multimodal experiences on children's literacy development particularly in the area of aural/visual literacy skills related to letter naming and word spelling?
2. What are the impact of the same approach on children's socioemotional development?
3. Finally, what are potential impacts of this approach and intervention on children's development?y in the a

In Chapter 2, I provided a literature review of research on the history of talking drums, the theory of multimodality and CHAT-inspired design-based research in applied psychology that informed the study: a family literacy intervention. Chapter 3 described the methods used to document and analyze the families' multimodal meaning production experiences in the development of children's literacy behaviors and socioemotional skills in the UGP workshops, and provided the conjecture map documenting how this UGP's instructional theory of action was enacted, including some of the expected outcomes for children's development of literacies. Over a 4-week study period with a focal group of five children (selected based on pre- and post-test as well as attendance), the research aimed to validate the conjecture that a multimodal symbol system that is at once visual, aural, embodied and digital can offer support for developing children's early literacy, social and emotional skills.

In Chapter 4, I described the formative research processes that led to the design of materials, tools, tasks and participant structures developed to scaffold literacy learning. Through the formative research process, I fine-tuned the instructional theory of action that was intended to meaningfully bring together access to embodied learning tools, social activities and recurrent literacy learning opportunities in the workshop. In the present chapter, I present the finalized design concept of the *Urban Griots Playground* curriculum and *Drumball Alphariddims* system that was used in the intervention, and present the findings that connected to the first two research questions on the impact of this approach on participants' literacy and socioemotional development. Findings connected to the third research question on the impacts on family relations are presented in Chapter 6.

CHAT-informed Interpretation of Findings

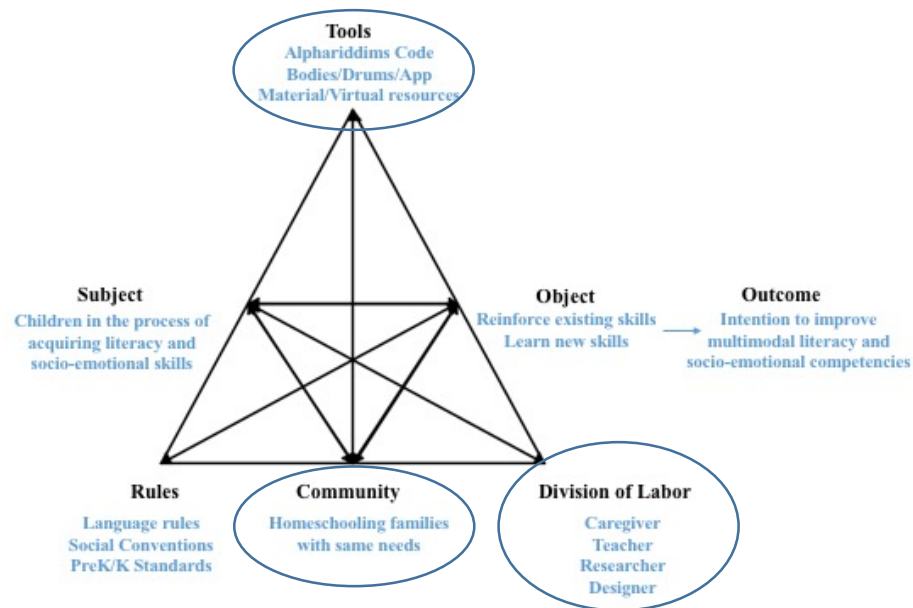
Chapter 3 also provided the conjecture map articulating the theoretical logic of the UGP model in terms of expected intervention outcomes in relation to the mediating processes that were tied to specific embodiments of rhythmic communication interactions (using body, drum and tablet respectively). Confirming the starting conjecture that a multimodal symbol system that

operates across visual (reading skills), embodied (kinesthetic skills) and aural (listening and speaking skills) dimensions of language can stimulate children's literacy behaviors and socio-emotional development, the findings suggest that children can explore literacy behaviors by actively engaging in embodied multimodal literacy practices in a community of peers and caregivers whose group activity is mediated by a variety of cultural tools. Results from the UGP study indicate that early childhood learning environments that are culturally-grounded and rich in voice, rhythm and movement stimulate children's natural curiosity and exploration of language by engaging tacit skills and knowledge they already possess. Within this context, the use of cultural tools and embodied learning technologies guided by competent and supportive caregivers may have the capacity to scaffold (and potentially accelerate) children's development of key multimodal literacies, emotional and social dispositions. Reaching more conclusive results would require further iterations of designing, trialing, implementing and studying the UGP over a longer period of time than 4 weeks.

The UGP workshop's learning ecology was designed on the premise that the repeated exposure and use of embodied learning practices in a community of practice using multimodal rhythmic call-and-response strategies can help to stimulate children's acquisition of key literacy and socio-emotional skills that prepare them for later learning. Developmental research has commonly limited attention to either the individual or the environment - for example, examining how adults teach children or how children construct reality, with an emphasis on either separate individuals or independent environmental elements as the basic units of analysis. As Rogoff (1995) explains, even when both the individual and the environment are considered, they are often regarded as separate entities rather than being mutually defined and interdependent in ways that preclude their separation as units or elements. While it is important to describe the contributions of each component part of the UGP "activity" or "event" which is the unit of analysis, to fully understand the impact of the UGP culturally-grounded embodied learning ecology on the children's development, it is incomplete to focus only on the individual parts of the system. To this end, there are three dimensions on which the children's sociocultural activity can be observed and focused, namely the community plane (related to their involvement in the community), the interpersonal plane (related to the division of labor during embodied learning practices) and the personal plane (in terms of their social participation and use of tools).

CHAT provides a lens for examining the critical components within an activity system, such as object-orientedness, tool mediation, intentionality, the relational and dualistic nature between the elements, and contradictions (Kaptelinin et al., 1995). In the UGP's context of multimodal literacy activity, the object is more or less fixed in the sense that the desired outcome for all involved is to support children's (subject) literacy and socio-emotional development. In a similar way, the rules are also fixed as the community does not have the power to change language rules, standard requirements or social conventions. Hence, these aspects are not included in the discussion. Overall, the object-oriented action of practicing new literacy and socio-emotional skills was most influenced by a network of three interrelated factors in the UGP activity system: cultural tools (tool), embodied learning practices (division of labor) and community involvement (community).

Figure 23 – The *Urban Griots Playground* focal activity system elements



Observing Sociocultural Activity on Communal, Interpersonal & Personal Planes

The research thus takes a sociocultural approach that involves observation of developmental processes in three planes of analysis (community, interpersonal and personal) to explain how by experiencing these dimensions of the UGP framework, children engaged with other children and adults in routine and tacit collaboration and in the process become prepared for later participation in related literacy events. To fully appreciate and understand children's learning and development on a holistic level, we need to regard as inseparable concepts reflecting these different planes of focus in sociocultural activity which are discussed in the following section in terms of apprenticeship, guided participation and participatory appropriation (Rogoff, 1995). While apprenticeship occurs on the community plane and is related to the individual's progressively deeper involvement within the institutional values and cultural constraints of an activity, guided participation refers to the interpersonal processes and systems of involvement between people (including cultural and social values) as they communicate and coordinate efforts to accomplish a task. Finally, participatory appropriation "is the personal process by which, through engagement in an activity with others mediated by cultural tools, individuals change and handle a later situation in ways prepared by their own participation in the previous situation" (p.3)

Findings

The three major findings presented in this chapter are centered on the focal children (n=5) who took the pre- and post-test or participated in all four sessions of the *Urban Griots Playground* workshop. The child-parent dyads and triad that attended the four workshop and consequently made up the focal cohort consisted of: Olem and Olivest; Arfia, Cam and Alcanat; Machi and Malabri; and finally Sam and Solibren. The findings are reported in terms of the

literacy and socio-emotional impacts of the *culturally-grounded, embodied learning environments and activities mediated by the Urban Griots* approach.

My findings are as follows:

1. The workshop allowed the focal cohort to explore literacy behaviors (like the awareness of print or manipulating letters of the alphabet) through the use of a visual symbol system deployed through multimodal means. Although the workshop did not have the intended outcome concerning the literacy tasks using drums (given the difficulty many of the children experienced producing the correct drum sounds, being so young), the use of the *Alphariddims* visual symbol system as a multimodal communicative resource seemed promising, although a bit advanced for this cohort. This finding has implications on the design of future iterations of the embodied learning ecology for this age group (and older) by exploring wearable drumpads instead of a peripheral device, along with a simplified version of the *Alphariddims*.
2. The focal cohort developed key social participation dispositions from their consistent exposure to the cognitive, social and emotional habits of mind reinforced through the face-to-face and digital learning activities and over the course of the four iterative cycles of implementation and reformulation.
3. The focal cohort increased understanding of emotions and the workshop was found to be most impactful on those children whose parents were most worried about, in terms of their current level of literacy or social-emotional development compared to their peers.

While the first finding relates specifically to the first research question on the literacy impacts of the *culturally-grounded, embodied learning environments and activities mediated by the Urban Griots approach*, the last two relate to the second research question on the contributions of this approach on social-emotional skills. Evidence for these findings come from the main data sources collected during the workshop sessions, namely the pre and post alphabetic assessments, the entry/exit interviews, my own observations and the participants' performance on face-to-face and digital tasks as it was documented on video. Unfortunately, given the lack of engagement of most of the parents with some the data collection procedures involving the online platform, no telemetric data on the children's at-home activity with the learning resources was collected (a severe drawback), and only one exit interview. This may have provided additional data to re-interpret the nature of these findings. Before presenting the evidence for each of these finding, it's necessary to provide a specific description of the learning context in which the activities leading to them took place.

The *Urban Griots Playground* workshop

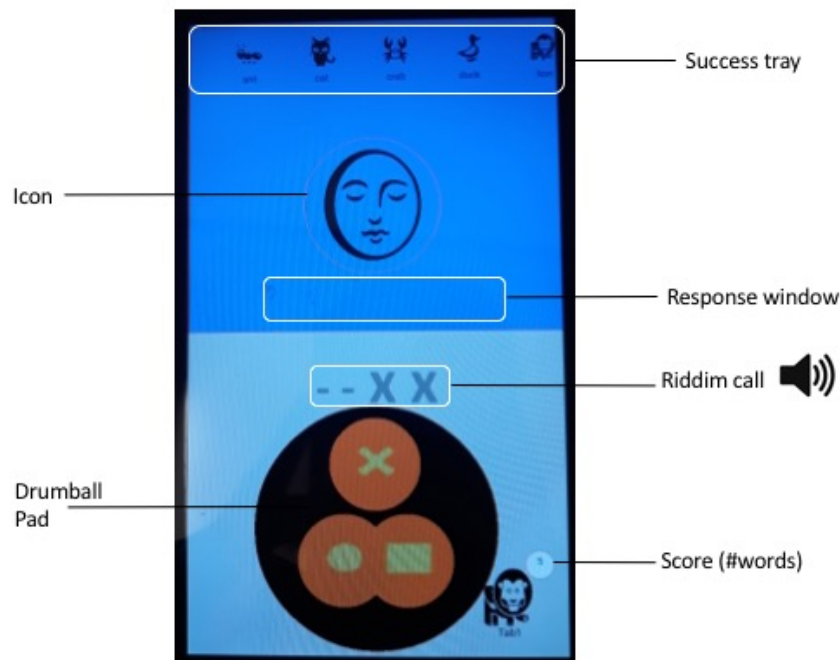
In the *Urban Griots Playground* I implemented a constructionist design in which children were able to manipulate letter, word and phrase entities through rhythm in order to recognize letters and spell out names and vocabulary words. Throughout the workshop, children were encouraged to play the role of o "vocabulary." lay the role of y, they completed tasks (defined as drum quests) to learn or reinforce their learning of the basic alphabet and drum vocabulary in order to communicate using their bodies, drums & digital tools. The workshops were designed to run in tandem with the *UrbanGriot.org* platform which consists of an app that provides rhythm-based literacy games playable from the browser using the *Drumball* or *Alphariddims* app as the interface (see Figure 23).

The *Drumball-Alphariddims* System

The complete *Drumball-Alphariddims* system functions as a transducer of hand-drummed patterns into multimodal digital output. It consists of the following components: a hardware interface layer that can detect hand/stick strikes, a transducer software layer to decode the rhythmic input and a front-end layer to render audiovisual output. The hardware layer includes 3 parts: an interface with sensors pads embedded in the surface to trigger signals which are received by an externalized MacBook Pro laptop computer connected from outside via USB. A Makey Makey circuit board connected to 3 drum pads augmented by force-resistive sensors is used for the transduction by providing presence of touch and intensity value information. Each pad sensor is connected to a particular input which tells whether the user's strike is a base, tone or a slap. The rhythmic input is then processed in Processing and the output page view response served via a web browser using Node.js, HTML5 and Javascript.

Given the material and time-related obstacles to designing and testing enough prototypes of the hardware interface that was robust enough to withstand the hands of 3 to 6-year olds, the decision was made to program an app-based version of the interaction that could be installed and used on a mobile phone or tablet, as the goal was to test the initial conjecture (*how do embodied ways of learning that use digitally-mediated multimodal call-and-response rhythmic interactions such as those provided by the Drumball-Alphariddims system open up the array of ways that children can access the alphabetic code and build their letter and word knowledge*) before implementing a full-fledged design. Therefore, the interface and curriculum were restricted to refining prototyping/testing core functions. This resulted in the use of an app version of the *Drumball-Alphariddims* experience, instead of a tangible user interface.

Figure 24 – Finalized user interface model of the *Alphariddims* game app



The learning environment is designed to operate as a call-and-response platform serving a digital corpus of multimodal content (letters, words, phrases) in a gamified interaction cycle. This is a multi-modal environment designed to provide real-time audiovisual feedback based on players' rhythmic input. The object of the game is to spell the names of icons (animals, objects). My intention was to ground the user interaction model in the following manner, inspired by the traditional cultural framework of drum language call-and-response model: the system makes a call (a letter of a word represented by its *Alphariddims* code, which is also sounded), a user listens to and responds to the call (they can play the pattern using the *Drumball* pad feature), an algorithm compares the user input pattern to the call pattern and validates. If correct, the letter corresponding to the code is displayed and sounded. If incorrect, a sound effect prompts the user to 'Try Again'. Once the word is successfully completed, the entire word is sounded and its label and icon move to the success tray at the top of the window.

The *Alphariddims* algorithm code is the main driving factor of the interaction, prompting the user. The algorithm code is the main driving factor of the interaction, prompting the user and validates. If correct, the letter corresponding to the code is displayed and sounded. If incorrect, the sprite changes to its corresponding letter at the current position in the word represented by the icon. The introduction of visual icons, alphabetic letters and words in this context is a must-have for the system in light of its broader educational objective, to serve as a rhythmic device for preschool children with the motor ability to tap ambidextrously and no prior drum knowledge to explore letter and picture naming through a non-alphabetic rhythm-based tangible user interface. Children progress from 3-, 4-, 5- (and more) letter words, which makes the tool appropriate for different skill levels.

For the "boss level", children are tasked with rhythmically reproducing the syllabic contour of proverbs of different word lengths. The intent of the proverbs in this game level are to provide meaningful sayings that children can reflect on based on their emotion in the moment. Building on the "emotion faces" activity detailed later in the chapter, proverbs are categorized according to the emotion that they are associated with. The screenshot in figure 25 is an illustration of a proverb associated with the emotion "Scared": "*when spider webs unite they can tie up a lion*". The internal symbolic representation of the phrase as a rhythmic notation contains information about the prosody of the utterance of each proverb, accounting for the actual tonal sequence of the syllables, which are represented by their corresponding *Alphariddims* symbol. The rhythmic pattern is first issued as a drum call played by the system which the user must correctly replicate in order for the spoken representation of the phrase to be sounded out, accompanied by a brief animation, as an indication of success.

Figure 25: Proverb with sequence of signs representing the prosody of the phrase using *Alphariddims* notation

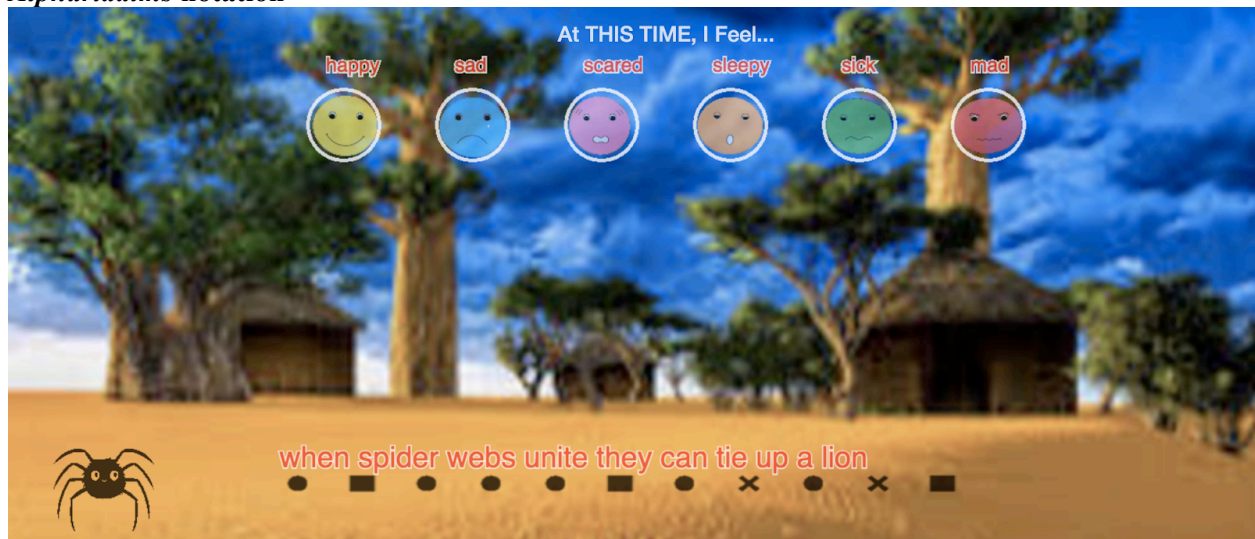


Table 4: Recapitulative of the Urban Griots digital corpus and its African proverbs collection

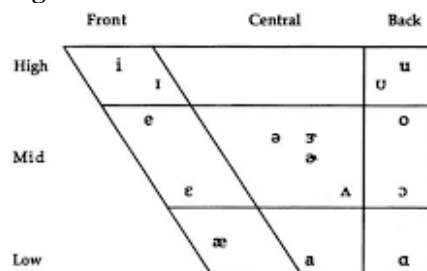
Origin	Animal	Proverb	Emotion
Ashanti	leopard	rain beats a leopard's skin but it does not wash out the spots	happy
Ashanti	moon	the moon moves slowly but it crosses the town	sleepy
Ethiopia	spider	when spider webs unite they can tie up a lion	scared
Ethiopia	cow	the cattle is as good as the pasture in which it grazes	sick
Ethiopia	egg	if one is not in a hurry even an egg will start walking	sleepy
Ghana	elephant	if there were no elephant in the jungle the buffalo would be a great	mad
Ghana	crab	a crab does not beget a bird	sad
Guinea	camel	one camel does not make fun of the other camel's lump	sad
Madagascar	crocodile	cross the river in a crowd and the crocodile won't eat you	scared
Nigeria	mouse	when the mouse laughs at the cat there is a hole nearby	happy
Nigeria	duck	some birds avoid the water ducks seek it	mad
Nigeria	earth	Earth is the queen of beds	sleepy
Senegal	centipede	if a centipede loses a leg it does not prevent him from walking	sick
Sierra Leone	hen	however full the house the hen finds a corner to lay in	scared
Sierra Leone	monkey	only a monkey understands a monkey	happy
Sierra Leone	cow	a cow must graze where she is tied	sleepy

Sierra Leone	dog	it is the wondering dog that finds the old bone	sad
Sudan	stone	a termite can do nothing to a stone save lick it	scared
Sudan	shrub	a little shrub may grow into a tree	mad
Uganda	lion	a roaring lion kills no game	mad
Zululand	ant	even an ant may harm an elephant	scared
Zululand	horse	the horse who arrives early gets good drinking water	sleepy
Zululand	monkey	when the man is away the monkey eats up the maize and enters the hut	sleepy
Zululand	puppy	one does not cross a river without getting wet	sick
Zululand	horse	a horse has four legs yet it often falls	sick
Cameroon	dog	if you do not step on a dog's tail he will not bite you	mad
Cameroon	monkey	by trying often the monkey learns to jump from the tree	sick
Cameroon	cricket	the cricket cries the year changes	sad
Cameroon	elephant	an elephant will reach to the roof of the house	happy
Congo	crow	two birds disputed about a kernel when a third swooped down and carried it off	mad

Under this scheme, proverbs are automatically parsed into words that are segmented to generate the sequence of syllabic fragments contained in the phrase, each of which are individually mapped to a specific drum sound (tone, slap or bass). The syllable-to-sound transduction is based on the International Phonetic Alphabet sound chart and its classification of vowels as having high (i, u), mid (e, o) or low (a) pitch. Constructing the prosodic rendering of such a proverb to the user as a rhythm sequence involves three steps:

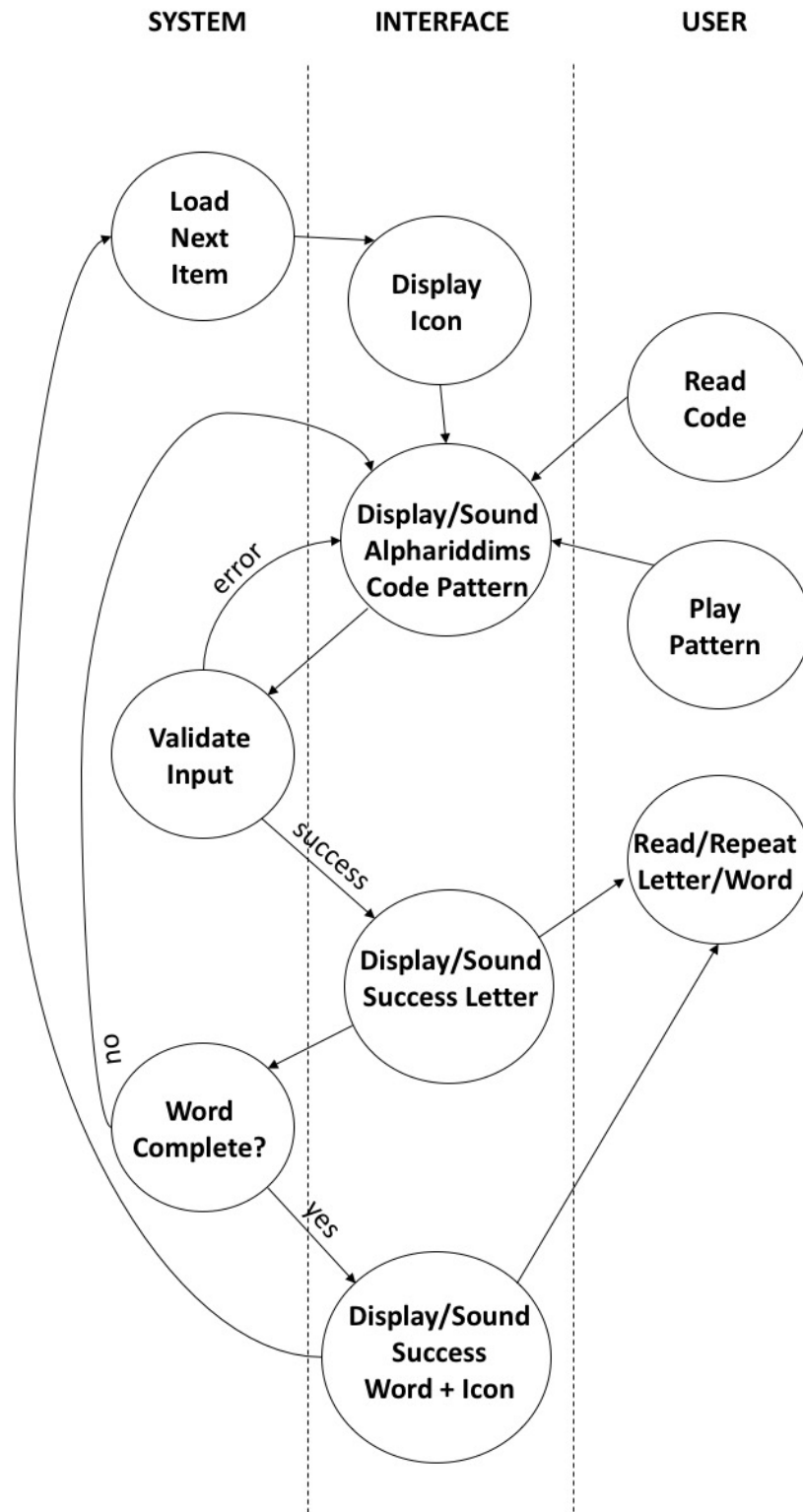
- 1) Syllabification: Segment the sentence into its syllabic fragments
- 2) Classification: classify each syllabic fragment as a high, mid or low pitch
- 3) Representation: associate each syllabic fragment's pitch to its corresponding drum sound (tone, slap, bass) & represent the corresponding syllable part in *Alphariddims* (● – x).

Figure 26 – International Phonetic Alphabet



Every vowel in English has a unique pitch (low, mid or high) and articulatory position based on the combination of tongue height, tongue advancement, and lip rounding.

Figure 27 – State diagram of the *Alphariddims* game algorithm showing internal dynamics



Preparing the Pedagogical Activities of the Face-to-Face and Digital Activity Systems

The goal of the family workshop is to stimulate literacy behaviors in children through the use of rhythmic embodied multimodal communication tasks that can help them gain awareness of the alphabet and words in print. The focus of the culminating activity for each session was as follows:

WORKSHOP ONE :: Drum Sounds

Learn and produce rhythms using the basic drum sounds
(tone, slap, base)

WORKSHOP TWO :: Drum Letters

Explore rhythm/movement to compose and share
first name initials using *Alphariddims* codes.

WORKSHOP THREE :: Drum Names

Multimodal production (body, drum) that help children
explore the letters in their name through *Alphariddims*
(4-beat drum codes representing alphabet letters).

WORKSHOP FOUR :: Digital Drum Talk

Paired child-parent e-learning activity including
digital content created using the *Alphariddims* app.

Each session was divided into three parts:

1. CIRCLE :: Communicate

Assembly time to connect in-person in a safe space of non-judgment before jumping into the day's lesson. The focus of the circle time component of the workshop is for families to build relationships and community through group call-and-response.

2. MULTIMODAL LEARNING :: Create

Children and parents explore communication and language through drum talk using their body, voice and instruments (drums, drumball)

3. GROUP PRACTICE :: Celebrate

Improv and drama exercises (pantomime, role-play) that help children and parents perform and share their creative narrations as multimedia stage performance pieces (poetry, music, dance) that reflect their identities, oral histories as well as the music, songs and dances by which they live their lives.

Each workshop is broken down into varying time blocks, outlined below:

CIRCLE ASSEMBLY

Introduction, Icebreaker, Announcements, Demonstrations

CIRCLE ACTIVITY

Verbomotor Processes

Communication Practice

Work on Targets

Execution of Roles

MULTIMODAL LEARNING ACTIVITY

Metacognitive Processes

Engage in Multimedia Production

Work on Deliverables

Execution of Roles

GROUP PRACTICE ACTIVITY

Improvisation Processes

Engage in Stage Acting

Work on Final Performance

Execution of Roles

SHARE-OUT

Next Steps

The *Urban Griots Playground* learning environment was thus intended to make possible a wide variety of pedagogical activities, which use different modalities (oral/aural, visual, kinesthetic and digital) that can mutually support one another to enable children to develop literacy and socio-emotional skills. Such multimodality is crucial to transforming parent and teacher practices which use different communication systems for different purposes. Table 5 summarizes the broader framework for scaffolding literacy learning through drum language. By framework, I mean the curricular, strategies, modes, methods and tasks for doing the work.

Table 5 – Curriculum Aligned to Preschool Early Literacy & Performance standards

1	Mode	Target Abilities/Skills	Instructional Method	Culminating Task
	Oral	Oral language	Sound Naming (tone-slap-bass)	children learn the Alfariddims symbols names and repeat various rhythmic tone-slap-bass patterns using their bodies and the drums
	Embodied	Multi-literacies Motor-sensory	Rhythm Making (body coding)	
	Visual	Reading	Pre-Test (alphabetic knowledge)	
2	Visual	Multi-literacies Visual Communication	Decoding emotions (face pictures)	children learn the Alfariddims code for their first name initial and produce the rhythmic pattern using their bodies and the drums
	Oral	Oral Language Print Knowledge	Letter Naming (alfariddims letter codes)	
	Embodied	Dance	Multimodal composition (dance-music choreography)	
3	Oral	Oral language Listening; Speaking	Listening comprehension (zip zap zop game)	children spell their first name by producing the rhythmic pattern for each letter using their bodies
	Visual-Embodied	Reading Motor-sensory	Body Name spelling (alfariddims symbols)	
	Drum-Oral	Music/Dance Performance	ase song; drum circle (voice, rhythm, movement)	
4	Drum-Oral	Oral Language Listening; Speaking	Drum circle; Letter Naming (alfariddims cards)	children spell the names of animal pictures using the Drumball pad interface for producing each letter in the Alfariddims tablet app
	Virtual	Multimodal Literacies	Alfariddims game app (word spelling)	
	Visual	Print Knowledge	Post-test (alphabetic knowledge)	

Much of the *Urban Griots Playground* innovative model and ecology of learning is rooted in the tangible affordances of the *Drumball* as a non-screen-and-keyboard-based communication technology that uses rhythm as a mode of human-computer interaction. Consequently, the instructional sequence was originally based on the assumption that the *Drumball* design would be fully completed by the time of the workshop. However, due to limited availability of resources and time, such a system could not be operationalized in time, so, in the absence of enough prototypes robust enough to withstand the handling of children under 6, the decision was made to only use the *Alfariddims* tablet-based app, which could easily be installed on Android phones or tablets. This decision to forego the use of the *Drumball* for the present study was reflected in the culminating tasks for the four sessions, each one progressively building up to the introduction of the digital app. On the other hand, the decision to only use the *Alfariddims* tablet-based app (which is screen-based and requires finer motor skills of the fingers) required mediation from the parent (which presented several challenges, occasionally) and inhibited the fully embodied mode of use that the *Drumball* would have provided to make the experience of digital drum talk more akin to actual drumming, which is ambidextrous, highly active, and requires grosser movements of the arms and hands.

Reformulating Children's Multimodal Meaning Production and Participation in UGP

During the weeks preceding the first workshop, I reviewed the video recordings from the Open House session which was facilitated months prior by a professional duo (husband and wife) of West African Drum & Dance and had extensive conversations with them about how to re-structure: 1) the instructional sequence in ways that would move me closer to my objective of investigating the potential impacts of *the embodied multimodal literacy learning activities and*

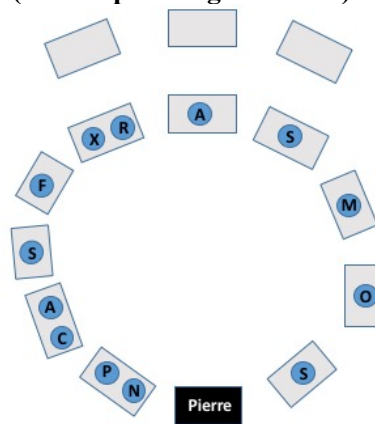
opportunities mediated by digital drum talk and, 2) the broader workshop ecology grounded in the cultural framework and principles of authentic trans-African practices.

When I asked his feedback, he suggested the following instructional sequence as a basic structure for each session, which I followed to some extent as a basic template to start from or refer back to:

- 15 mins: Instrument Petting Zoo (Djembe, Odone, Bongo, Shakers, Sticks, etc...)
- 15 mins: Rhythm Practice (e.g. Kuku rhythm)
 - o Chant: sing out the pattern
 - o Application: play out on drums
- 15 mins: Digital Practice (*Alphariddims*)
- 15 mins: Play
 - o Embodied knowledge
 - o Movement

Below is a visual representation of the space layout on the first day with focal and peripheral zones of participation, which resulted from these conversations with these practitioners as well as parents.

Figure 28. Workshop space layout (as set up during Session 1) with inner and outer circles



Through these pedagogical and digital activities, it was found as noted that the workshop's learning ecology and approach to literacy instruction via rhythm-mediated embodied learning activities and social games had a stimulating impact on children's literacy behaviors and their active social participation and understanding of emotions in relation to visual icons and oral proverbs. However, the sample size was too small and the change in pre- and post-tests too modest to validate the efficacy of the method for teaching literacy via a multimodal symbol system. Still, the findings highlight the potential of rhythm-mediated family-based activities in fostering *at-risk* children's early literacy behaviors and socio-emotional skills as a means of promoting school readiness. Indeed, the intervention was found to be most effective for those focal children whose parents were most concerned for, in terms of early literacy and/or socio-emotional development, although some of the children were too young to understand the intervention, given the complexity of the multimodal use of the symbol system which requires more translations than standard reading.

Finding 1: Stimulating literacy behaviors through the use of a visual symbol system deployed through multimodal means

This finding relates to the first research question on the *contributions of the UGP approach on the children's literacy behaviors*. I chose multimodal call-and-response as a strategy of instruction to see how this mode could provide multiple ways of stimulating and supporting children's early literacy acquisition through the use of a symbol system that can be engaged with through multiple sensory functions (visual, aural, embodied, digital). By providing various opportunities for engaging with call-and-response games and language tasks (*quests*) scaffolded by a visual symbol system (*Alphariddims*) spanning across multiple semiotic domains (visual-embodied-aural-digital) the workshop provided spaces, tools and processes for socially organized literacy practices. My observation, corroborated by parents' report during the focus group, was that the *Alphariddims* transduction scheme was too complex for the focal cohort as it required several consecutive mappings (symbol to gesture to sound to letter-name and letter-visual). Nonetheless, by intentionally creating recurring opportunities for social meaning-making practices via call-and-response involving interactions using voice, body rhythm and movement, the embodied and multimodal activities of the workshop provided many opportunities for children to manipulate sounds, read symbols and letters, count numbers, spell words and convey emotions by leveraging their ability to move their bodies and produce rhythm through back-and-forth exchanges and solo performances.

Pre and Post Letter Naming Assessments

During Workshop 1, parents were asked to administer a 3-min alphabetic knowledge test consisting of the 26 letters of the alphabet, both lower and upper case, for a total of 52 letters. At the end of Workshop 4, parents administered the same assessment. Looking at the entry survey results, most (if not all) of the parents indicated that they were satisfied or very satisfied with their child's language and vocabulary learning development at this stage, however based on the pretest on alphabetic knowledge it was found that only two children knew most or all of their letters (Olem and Cam). Most parents also reported the pre-test being the first occasion of them assessing or evaluating their child's alphabetic knowledge. However, fewer parents and children concluded the workshops and took the final post-test, which would have allowed to better ascertain the efficacy of the treatment. Table 6 summarizes the post-test scores of focal children in comparison to their pre-test scores, plus a description of the letters recognized for each.

Table 6 – Pre- and Post-Test Results

Child	Gender	Age (years)	Age (months)	Pre-Test		Post-Test		Letters	
				#correct	#error	#correct	#error	Pre-	Post-
Olem	Female	3	40	52	0	52	0	Aa - Zz	Aa - Zz
Sam	Male	3	39	3	49	9	43	A, O, Z	A, Oo, Pp, Ss, Yy
Cam	Male	6	72	52	0	52	0	Aa - Zz	Aa - Zz
Arfia	Female	3	36	0	52	4	48	-	A, B, O, e

As the data shows, by the end of the workshops Sam and Arfia made a modest gain of 6 and 4 letters respectively, while Olem and Cam showed no sign of change as they already knew all their letters. Beyond assessment, during the four workshop sessions, the attempt was made to reinforce and improve the children's literacy behaviors as evidenced by their active participation in applying the *Alphariddims* visual symbol system to language/kinesthetic play or digital tasks and their observable aptitude and motivation to participate socially and be tacitly, cognitively and emotionally involved. To this end, there were 3 primary habits of mind that relate to the ways in which the *Urban Griots* curriculum structured children's experiences in the workshop.

These included, in order:

1. ***Understanding visual symbols as gestures to produce sound (Workshops 1 and 2):*** All focal children were able to participate in the body rhythms activity through the association of visual symbols representing distinct gestures producing individual sounds. Evidence of this was observed in the first culminating task of the instructional sequence, concerned with the embodied expression of the *Alphariddims* symbol system, which was introduced in terms of the pitch of the sounds they represent, and are also mapped to specific gestures, like:

- : slap (high, clap hands),
- ∴ tone (middle, slap thighs/torso),
- x: base (low, stomp feet).

The analysis which led to this finding was based on the patterns of interaction that emerged in Workshops 1 and 2's culminating activities exploring first name initials through embodied manipulation of the *Alphariddims* symbol system and how these provide evidence for the development of a tacit symbolic understanding. This gesture-based face-to-face group activity laid the foundation for leveraging the symbol system to produce letters in a tacit manner (as a precursor to the digital spelling activity) and the circular flow reinforced children's exposure to the *Alphariddims* symbols and letter names by repeating each other's patterns in call-and-response. Even for those children who already knew their letters, the *quest* of embodying one's first name initial using an unfamiliar symbol system provided an engaging and/or challenging opportunity.

Figure 29. Participants taking turns sharing the Body Riddims for their first name initial that they came up with in pairs using the *Alphariddims* symbol system.



This task centered on the dyadic interaction between parent and child, with the parent playing the role of the caller, verbally calling out the sequence of sounds making up the rhythm pattern for the first initial of the child's name, and the child responding by performing that rhythm following the principles of the symbol-sound-gesture production rules. Within 10-minutes and with the constellation of participants present during Workshop 1, the round yielded a count of 13 practice letters (1 per child), with one letter appearing three times, and one letter appearing twice, due to some children having names with the same initial letter. The letters explored were: S (3), A (2), O, M, R, X, F, C, P and N.

Excerpt 5.1: Summary from circle activity exploring first name initials through *Body Riddims*

Alphariddim Code	Parent Verbal Call	Child Embodied Response
S • • • x	Solibren: 1, 2, 3, stomp	Soli: slaps the correct count without varying movements
O - - - x	Olivest: 1, 2, 3, stomp	Olem: stomps to the beat
M - - x x	Malabri: 2 claps and 2 stomps	Mochi: clapping and stomping at the same time
A • - x x	Alcanat: tone, slap, stomp, stomp	Children out of camera view
C - • - •	Alcanat: Tone, slap, tone, stomp	

As the data above show, each practice round provided each focal child with the opportunity to read, hear and speak the letter name of his/her name's first initial, as well as the chance to embody this letter by performing its *Alphariddims* pattern. Also, some parents seem to have been confused about the symbol-action-sound production rules that this instructional sequence was aimed at reinforcing. Several parents seemed to mix numbers, sounds and actions (e.g. Solibren and Olivest "1, 2, 3, stomp" or Alcanat "tone, slap, stomp, stomp"). While not all focal children performed the sequence of gestures for their own initial correctly, all of them had several opportunities to practice the association of each visual symbol to its corresponding body movement and understanding this rhythmic gesture as a speech act akin to speaking or writing their name's first initial as a representation of themselves, which was the main learning goal of the activity. The structure of the activity provided opportunities for every child to step into the spotlight and be acknowledged by their peers. While some children were excited about this opportunity to showcase the body rhythm for their first name initial (like Sam exclaiming "Now

it's my turn" or "S, that's mine"), not everyone felt as inclined to share (like Cam, whose reluctance in publicly sharing was not surprising given his already complete knowledge of the alphabet and older age compared to the rest of the group). In contrast, Olem who also knew all her letters but younger, and reported by her mother in the interview to "like anything that involves beats and rhythm", found enjoyment in participating and sharing publicly in the culminating tasks, except when interrupted by others.

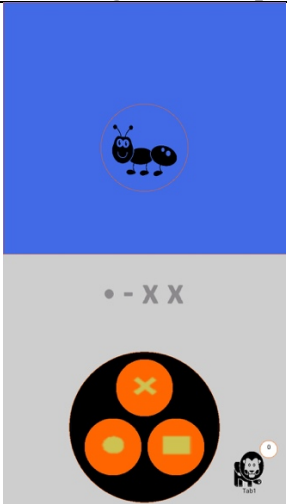
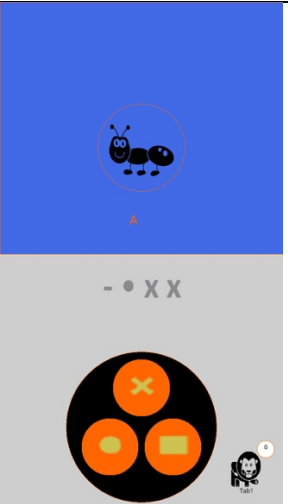
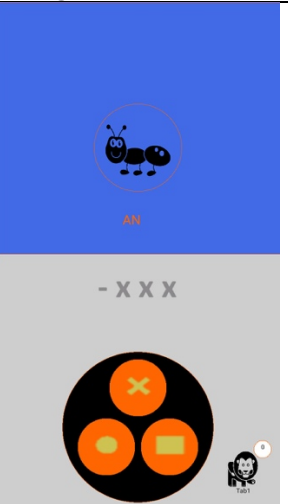
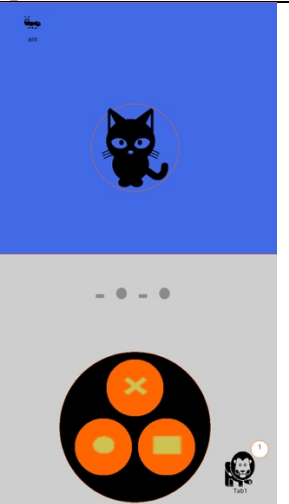
2. ***Applying rhythm as code to represent letters (Workshop 3)***: It was found most of the focal children displayed visible enthusiasm and enjoyment of embodied language learning by symbolically representing syllables or letters as rhythms performed on their bodies. For example, in the culminating activity of Workshop 3, we focused on embodying first names (which consists in matching each letter in the name to its corresponding rhythm based on the symbol system). My choice of the body (instead of the drum) as the tool for this task was informed by my observation that most of the children (being so young) had difficulty producing the distinct drum sounds using the hand drum techniques as demonstrated, and thus some grew frustrated or disengaged. This really takes years of practice, so building on the activity from Workshops 1 and 2 was seen as a good way to proceed that engaged the children to participate *socially* (by interacting with others, taking turns leading and following the leader) and thereby acquire literacy behaviors, *kinesthetically* (by performing the body riddim for each letter in their name), *verbally* (by repeating and talking about letters, symbols, sounds and movements) and *cognitively* (by reading the letters and visual symbols from their card placed at the center of the circle, where all participants could see). Through the recognition of the *Alphariddims* visual symbol patterns as movement sequences representing alphabet letters from Workshops 1 and 2, the children were tasked with composing (with the help of their parents) body rhythms that effectively "spelled out" their first name. Although none of the focal children were actually documented spelling their names through movement using the *Alphariddims*, due to various interruptions and distractions in the environment during the culminating activity (see below), all children had the opportunity to practice with their parent for 10 minutes before the break by engaging in several close readings of the given rhythmic sequence for each letter in their name, translating each sequence of symbols into a sequence of movements.

However, by the time of the culminating task segment of the session (which followed immediately after the break), the attention and energy of the group was too scattered as the children got tired. This breakdown of the activity could be further indication that the task was too advanced for this cohort, in that it involved several levels of abstraction. Perhaps for children with a baseline knowledge of letters and word spelling, this activity could be appropriately challenging, and fun.

3. ***Understanding visual symbols as rhythmic input to spell words (Workshop 4)*** –

All of the focal children were able to engage in letter recognition and gain a sense of enjoyment/motivation from the digital task consisting in the spelling of animal/object names (e.g. the word 'ant') pictorially illustrated and annotated by visual symbolic patterns representing each individual letter to be produced sequentially on the tablet in order to generate the correct word response by the system. To provide context, I produce below screenshots of a sample user interaction on this particular task.

Figure 30. Sequence of a user interaction spelling the word ‘Ant’ in *Alphariddims*

			
On the opening screen, the child is prompted with a visual icon – in this case, an ant – along with an <i>Alphariddims</i> code, which represents the first letter of the icon name	Upon successful input of the code using the <i>Drumball</i> pad portion of the interface, the first letter appears and the <i>Alphariddims</i> code switches to the letter A	The process repeats for the second letter, which appears next to the first letter (as it would in writing) once the child successfully inputs the code for the letter N	Finally, once the word is complete, the icon moves up to the success tray along with its name under it, and the new icon and code are introduced. The score is updated by one.

For children who did yet not possess the cognitive and fine-grained embodied skills necessary to write with a pen, the *Alphariddims* app helped them develop a basic understanding of writing as the manipulation of visual symbols through sensory-motor interaction in order to encode meaning using a restricted set of signs. Furthermore, by incorporating the same symbol system used in the face-to-face activity, this tool reinforced symbolic understanding, expanding its multimodal applications from the physical into the digital realm. The structure of the activity was such that it allowed for hybrid ways to participate in the activity together. One such case was Cam, Arfia and Alcanat, with Cam spelling on the tablet while Arfia played out on the drum the pattern for each letter in the word, while Alcanat guided both by reading out loud the full current sound sequence.

Excerpt 5.2: Cam, Arfia and Alcanat spelling ‘Crab’



Alcanat: And *tone slap tone base*

Cam: *Presses tone slap tone base on the Drumball pad*

System: R

Arfia sitting on her drum playing the sounds along



Use of the app also reinforced and extended the symbolic understanding introduced in the workshop by integrating the same visual symbols and sounds that the children already knew the names for. This provided a way for them to form each letter by performing its rhythmic pattern which in turn required them to keep count of the correct number of beats while identifying the accurate symbols to press. By keeping tally of the correct number of success words so far and validating children’s input by revealing the target letter for each correct pattern played in real-time, the system also helped introduce children to letter recognition and word segmentation skills, as well as numerical understanding and counting skills, in the context of a picture naming activity. Here’s an excerpt that reveals the interaction of these skills (symbolic understanding, counting and word segmentation) within a single cycle of play.

Excerpt 5.3: Olem and Olivest spelling ‘Ant’



Olivest: So this is the next letter, so we’re going to do *slap tone base base*. So which one is *slap*. Can you **find slap**?

Olem: **This?** (*points to slap symbol on the Drumball pad then presses it*)

Olivest: Can you try a *tone*?

Olem: *presses tone*

Olivest: Ok. And *base and base*

Olem: *presses base twice*

System: N

Olivest: Good job! Now you did N. The next letter is T. T is *slap base base base*.

Finding 2: Cultivating key social participation dispositions

The UGP model blended a culturally-grounded and arts-based approach to language learning in a group setting to provide a unique pedagogy for stimulating early literacy and communication skills, but also using and applying embodied learning with call-and-response to engage social skills. In this context, a key aspect of the pedagogical approach was to engage the children's verbal and motor skills in dyadic or circle activities centered on how rhythms and symbols can be functional in interpersonal and group situations in and beyond the physical world. An important organizational structure was to conduct each session in a circle format, which provided everyone (child and parent) an equal footing for participation, using the center of the circle as a space for individual performances to be shared with the whole group. The circle as a framework of participation provided an authentic context for practicing social participation dispositions (like self-regulation, prosocial behavior, and self-confidence), while developing awareness of what constitutes helpful versus disruptive behaviors in a group setting (as was the case when Machi, out of excitement and eagerness to participate, joined Olem during her turn for the culminating activity in session 4, and had to be called back by Malabri, his mother). To this point, the mini-celebration held after each share-out by clapping and cheering reinforced positive socio-emotional outcomes and a sense of community, by virtue of the turn-taking process, which varied according to the activity at hand.

Excerpt 5.4: Olem joined by Machi during final share-out



1. Olivest: *(claps) (claps) (claps) (stomps)*
2. Olem: *Tries to follow along then stops and pulls close to Olivest as Machi is back in the circle following along the rhythm.*
3. Pierre: *Good job Olem. It's ok. We're sharing the circle today. Cuz you all are going to play in the circle today, so it's ok.*
Sam runs to the center of the circle and picks up Olem's card and hands it to Pierre

Throughout the sessions, social participation was mediated via simple circle conversations about sharing emotions and personal stories, music and dance, to group theatre exercises like Zip Zap Zop, that could engage children's fully embodied expression. These kinds of circle workshop activities held throughout the iterative cycles of implementation and reformulation

helped ground the following “local instruction theories” about verbomotor call-and-response as an instructional strategy that provided multiple ways of stimulating/supporting children’s acquisition of multimodal skills:

- Embodied Sociality – Opportunities for mediating literacy acquisition via embodied practices span across multiple semiotic domains and depend on how space, tools and processes are socially organized in relation to the visual symbol system used for making meaning
- Verbomotor Call-and-response –cyclical exchanges of meaning using culturally-grounded communication technologies involves verbal, movement and rhythmic call-and-response interactions that can increase the number of back-and-forth opportunities for children to manipulate sounds and symbols (representing letters, numbers and words) by leveraging their ability to move their bodies in repetitive and symbolic ways, thus reinforcing early literacy acquisition while providing a socially-stimulating and emotionally-supportive environment

In the Scratch Dance activity, my goals were to have children explore their own bodies and natural movements by picking a song they like and choreographing a simple dance to it. My intent, which I shared with the parents, was to encourage them to improvise while employing some of the steps/moves they had learned from using the visual symbol system. The final group share-out circle integrated technology and movement expression with lyrical and musical selections made by children to expand their understanding on how emotions can be expressed and shared, how technology can be leveraged to more fully communicate our message to others, and how personal contributions to social situations can be made through sound or movement. From this activity, the high-level of social interaction, degree of participation and sense of self-direction I observed in the children indicated that this approach had a positive impact regarding social skills development, as the children took great pride in showcasing original and improvised dance choreographies to the music of their choice.

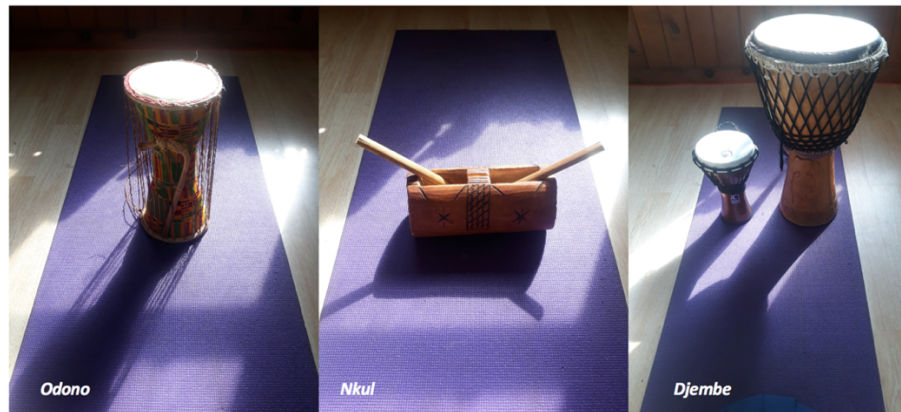
5.5: Sam joining Olem during her *Scratch Dance* presentation



Additionally, children engaged in talk using the traditional names of various talking drums in the “Instrument Petting Zoo” activity, which took place during Workshops 1 and 2. The languages in these discussions reflected the culture of origin for each instrument – the *odono* (the Ga name from Ghana for the hourglass-shaped talking drums), the *nkul* (the Ewondo name from

Cameroon for the slit drum) and the *djembe* (the Bambara name from Mali for the goblet shaped drum). Through this activity, children learned about the history of each instrument (some memorizing their African names), its physical characteristics and mechanics, and each took turns playing after a brief demonstration of how sounds are produced.

Figure 31. Talking drum instruments used for the Instrument Petting Zoo workshop activity



This activity was also another occasion for children to learn how to name and recognize sounds according to their unique pitch characteristic (low, medium, high), which in turn reinforced acquisition and use of the *Alphariddims* symbol system as the following excerpt shows:

Excerpt 5.6: *Instrument Petting Zoo* circle discussion

1. Pierre: The strings. You got the body of the drum in here. You got the skin. 2 skins. So you can play it on both sides. *Demonstrates*. This one has the strings so that you can squeeze them. *Demonstrates by playing a series of beats of varying pitches (mid, high and low) obtained by striking the drum head with the stick while squeezing and loosening the strings*. Right? You can get all the tones. Do you remember the tones? The names of the tones? The low tone. If I don't squeeze the strings, this is what it sounds like. *Plays by loosening all the strings to get a low pitch*. Is that high or is that low?
2. Child: Low
3. Group: *Various parents and children echo 'low'*
4. Pierre: It's low right? It's low. What about this? *Plays by squeezing all the strings to get a high pitch*. Is that high or low?
5. Child 3: High
6. Pierre: That's high right? So what do you call the high tone? The high sound? *Plays high sounds*
7. Group: *silent*
8. Pierre: What do you call the low sound? *Plays base sounds*
9. Child: Base
10. Pierre: Base. And its symbol is what?
11. Child 1: X (*Various parents and children echo 'X'*)
12. Pierre: X. Right? Which is the base. *Plays base sounds*. And above that comes what? In between the high and the low is called what?

13. Parent: Tone
14. Parent: Tone
15. Child: Tone
16. Pierre: Tone. Tone, which is represented by what?
17. Group: silent
18. Pierre: The circle. The little dot. Right? And then the high one was called what?
19. Parent: Slap
20. Child 1: Slap
21. Child 2: Slap
22. Pierre: Which was represented by what?
23. Child 1 and 2: Line
24. Pierre: The line. Very good. Everybody remembers. So, with the base (*plays base*), the tone (*plays tone*) and the slap (*plays slap*), you can make rhythm. (*Improvises a rhythm – base tone slap base base, base tone slap base base,*
25. Child: Slap

The tactics used to carry out the *Instrument Petting Zoo* instructional sequence were varied and ranged from verbal question-and-answer exchanges to probe children's memory of the vocabulary words introduced in Session 1, to aural recognition of sounds by name to sharpen listening skills, including visual recognition of symbols representing sounds by name and drum-oral production of sounds and syllables using call-and-response. Proceeding according to the instructional theory, this first segment consists of: a demonstration of drum sounds of different pitches to probe the children's 1) perception of these sounds and 2) knowledge of their distinct names (Line 1: *Do you remember the tones? The names of the tones?*), as well as knowledge of their associated symbol (Line 10: *And its symbol is what?* Line 16: *which is represented by what?*). By being able to call out the correct name (slap) and corresponding symbol (line –) representing high pitch sounds (Lines 20-23), the children demonstrated their understanding of the musical concept of pitch as well as the literacy concept of a symbol system, and their dual role in encoding meaning, which was the main purpose of the activity.

Excerpt 5.7 *Instrument Petting Zoo* circle discussion (cont.)

26. Pierre: Why is it called a talking drum?
27. Child: Because it sounds like somebody's talking
28. Pierre: Sounds like somebody's talking? Ok. So, what's the name of the drum called again?
29. Children: Talking drum
30. Pierre: And in its language?
31. Parent and Children: *Odon*
32. Pierre: In Ga, it's called o-do-no, so O, as a sound, is it low or high?
33. Group: *Chatters*.
34. Child: It might be high.
35. Pierre: It might be high?
36. Group: *Chatters*
37. Pierre: *O (plays base) Do (plays base) No (plays base)*
O (plays base) Do (plays base) No (plays base). Right? It's low.
Plays again: base base base

base base base

base (O) base (Do) base (No)

base (O) base (Do) base (No)

Good. And, what was this one called? (*picking up the nkul*)

38. Child: Talking drum

39. Pierre: Talking drum too. And, its original name is called what?

40. Group: *silent*

41. Pierre: The *nkul*. Right? It's kinda cool. Easy name to remember. This one is called the *nkul*. And, this one only has two sounds. A low. *Strikes the low lip of the nkul*. So again, this is the mouth. You got the lips. And you beat the lips with the stick. *Strikes the high lip of the nkul*. Which one is the low one? Number 1 or number 2? Which one is the low one?

42. Child: Number 1

43. Pierre: *beats each lip consecutively a few times*. It's number 1. And the way that it sounds is because it's carved inside. So, this is a piece of a tree that's hollowed out, and one side is more hollow than the other side, which is why it gives you a different resonance, a different sound. So this one you play with two hands and two sticks. *Briefly demonstrates an improvised rhythm*. Ok, so this one is called the *nkul*. And, what's this one called?

44. Child: A drum.

45. Pierre: What type of drum?

46. Group: *chatters, whispers*.

47. Pierre: Did we talk about this last week.

48. Olem: A *djembe*

49. Pierre: A *djembe*! Very good. It's a *djembe* drum. So, now we'll pull out the *djembes* and we're going to practice a little bit of what we did last week. As our way of getting warmed up, getting started. *Pulls out djembes from the bag and places them in the center of the circle*. So, if you all want to pick a drum. I think we should have one for everybody this time, and we'll have our little practice circle.

This second segment exemplifies the varied uses of drum-oral call-and-response mediated by three different talking drum instruments and their acoustic and physical characteristics as a means to probe children's vocabulary knowledge (Line 28: *So what's the name of the drum called again?* Line 30: *And in its language?*). This excerpt begins by first recalling the metaphor of the talking drum as an extension of the mouth (Line 27: *Because it sounds like somebody talking*) before illustrating the drum language principle as used by the *odono* (with three pitch levels – high, medium and low) and the *nkul* (with two pitch levels – high and low). This example also introduced the syllabic segmentation of a sample word (Line 37) as an illustration of how the drum language mimics actual speech. The passage concludes with the introduction of the *djembe*, which formed the basis of the children's circle practice on producing the actual drum sounds.

Along similar lines, "Zip Zap Zop" is a game often used as a theatre preparation exercise. The rules of this game have many variations. The most basic form of the game involves a circle of people sending a "clap" or "impulse" or "ball of energy" to each other in turn, saying the words "zip", "zap" and "zop" in turn each time. In our version, the object of the game was for participants to hold the ordered rhythm sequence (*zip-zap-zop*), while passing the focus to one another around the circle, thus providing a more structured experience of embodied-oral call-

and-response. My goal here was first to get participants to interact with each other through verbomotor actions. My secondary goal was to stimulate the children's attention and focusing skills, given that the game engages all the communicative senses (looking, listening, speaking and moving). This playful, social and physical activity was found to facilitate various kinds of parent-child and child-child interactions that they may not typically experience, which enhanced certain social skills in the children, like turn-taking, playing, laughing, sharing, commenting, leading, assisting and telling stories.

Several of the parents were first-time parents who did not always understand nor share the UGP vision of culturally-grounded pedagogy or approach to early literacy research. My sense is that, for some, embodied learning activities such as learning the alphabet, spelling of words, or responding to calls through body or drum rhythms, conflicted with their existing ideas about how children learn to read. But it was observed that these activities engaged the focal children's attention to letters and symbols while activating their social identity as a learner in a community of peers who all achieve.

One example of such evidence of the impacts of the verbomotor activities experienced in UGP on a child's literacy behaviors and social skills is the case of Machi of whom Malabri reported: *"He used to not be able of talking lower. Now he can do much lower increments of volume. He's able to pay attention for a longer time. Now he's starting to break down the words. Now he goes slow and faster with the drum instead of just slamming. He's trying to get the beats. At home he'll try to drum on improvised surfaces. He's clapping so much since taking the class."* This finding is significant as Machi and Malabri are amongst those participants who had not attended any other music or arts-based programs besides UGP, which suggests an impact of this approach, but perhaps not unique to it.

Finding 3: Scaffolding the emotional understanding and social identity development of children

In addition to cultivating key social participation/literacy behaviors, the UGP also focused on developing children's understanding of emotions. To assess shifts in emotional understanding, I used a "picture naming" activity based on the visual props below. This tool was used twice during circle talk in Workshops 2 and 3. This finding relates to the research question on the impact of activities mediated by the *Urban Griots* approach to multimodal experiences on children's development of socio-emotional skills and literacy skills related to picture naming.

Figure 32. Iconic representations used as visual props for the perception of facial emotions



The intent of the opening circle activity was to stimulate children's facial expression of relating socially and emotionally with others by asking them to think of words describing how they (or others) are feeling. In the opening segment, while the parents said they felt *optimistic, rested, calm, at peace, grateful, cozy*, only two of the focal children had a word to share how they were

feeling (*Olem: good, Machi: good,*) while the rest did not respond or spoke inaudibly to their mother only. The goal of the activity was to help children learn what they need to know to become aware of their bodies and their emotions, to be able to look at others' emotions and bodies and be able to *read* their emotional relationship(s) with the environment/others. The findings, based on my observations (reflected in the transcript below) and parents others' emotion that the activity had a positive impact on the children. The findings, based on my observations (reflected in the transcript below) and parents others' emotion and bodies and be able to feeling. cture naming" activity based on the visual props below or storytelling with others). This activity also provided an opportunity to acquire vocabulary for describing shapes and colors, as shown in the excerpt below. Unfortunately, being a transcription from an audio recording, this data did not permit disambiguation of children's voices, which are thus all anonymized.

Excerpt 5.8: Face-to-face talk exchanges among participants from the *Opening Circle* activity

1. Pierre: Nice! Alright. A range of emotions this morning. As is every day. And, I guess before we get into the recap, I just wanted to introduce these cards. So, can you tell me what this image looks like?
2. (*shows icon of 'sleepy'*)
3. Group: *chatter*
4. Child: O
5. Pierre: O? It says O? How do you think he or she is feeling?
6. Child: Yawning
7. Pierre: Yawning? Yawning right? A little sleepy. You see the eyes, drooping. Kind of like, about to fall asleep. And the mouth. *Yawns*. Big yawn. You see that? What about this one?
8. Group: *chatter.. someone says 'Sad'*
9. Child 1: Mad.
10. Pierre: Is it sad? I haven't seen it yet. Sad? (*turns over the card*)
11. Child 2: I feel happy.
12. Child 3: It looks like it's sad.
13. Pierre: What color is it?
14. Child 3: Green
15. Pierre: Green. Right. Does that? Is that the natural skin of people? Green? When does your color look green?
16. (*Inaudible chatter as group reflects*)
17. Pierre: huh? Which one?
18. Child 2: When you're sick!
19. Pierre: When you're sick right? Maybe he or she ate something bad and it made him or her sick. So you see the mouth (*ooh makes groaning sound*) kind of in pain. And the face is all green. So that's a sick feeling. Do you ever feel sick? Yeah? You can relate to that?
20. Child 1: A little bit
21. Pierre: What about this one?
22. Child 3: He looks scared
23. Pierre: Scared? Scared right. What makes you think he looks scared?
24. Child 3: Because he's going like this (*makes scared face*)

25. Pierre: Right, he's going like this (*makes scared face in response*)

26. Group: *Laughs*

27. Pierre: Right? How do you go when you're scared?

28. Child 4: Hiiiiiii

29. Pierre: Hiiiiii

30. Group: *Laughs*

31. Pierre: (*laughs*) You scream right? When you're scared. What else do you do when you're scared?

32. Child 3: Ahhhhhh

33. Pierre: Ahhhhhh... you run right? (*laughs*)

34. Group: *Laughs*

35. Pierre: You see the eyes? (*turns over to next image*) What about this one?

36. Children: Sad

37. Pierre: Sad? Why is it sad?

38. Child: because the eyes are (*inaudible*)

39. Child 3: Because he has a sad face like this (*makes a sad face*)

40. Pierre: Because he has a sad face like that. Do you ever look sad? Do you ever look like this? Yeah? When do you look like this? What makes you look like this?

41. Solibren: Sam says he eats something bad

42. Pierre: When you eat something bad you're sad. Yeah, it doesn't make you feel too good. Anybody else? Alright, next one. What about this one?

43. Children: Mad

44. Pierre: Everybody sees mad here. Huh! Interesting. Mad. Why mad?

45. Child 2: Cuz mad.

46. Group: *Chatter (inaudible)*

47. Pierre: Maybe he hurt somebody and he said sorry? He was mad for a moment, right? What color is it?

48. Child: Red

49. Pierre: Red, right! What makes your color, what makes your skin red?

50. Child 1: When a mosquito bites you

51. Pierre: Sometimes when a mosquito bites you? That's very true.

52. Parent: Your skin gets mad!

53. Pierre: Your skin gets mad.. (*laughs*) And then, when all your blood goes to your face. Right? It's the blood inside of your body rushing to your face, when you're mad, that makes your face red. And you see how the eye, the ... what do you call this?

54. Child 2: Eyebrows

55. Pierre: Eyebrows. Ok, I heard eyebrows. When you're mad, how do your eyebrows go?

56. Children: *Frown*

57. Pierre: Right, you frown right. Not happy. Right? (*turns over to next image*)

58. Child 3: Happy.

100. Child 2: Smiling

101. Pierre: Smiling. Everybody sees happy here?

102. Children: Yeah

103. Pierre: The golden face. Happiness. Alright. Good. Good.

104. Child 2: I feel happy when I'm (*inaudible*)

105. Pierre: What makes you feel like this? What makes you feel happy?

- 106. Child 5: When I run really fast!
- 107. Group: *Chatters*
- 108. Pierre: When you run really fast.

The facial emotions picture naming task aimed to help children understand that emotions are not private to us but can be *seen, read* and *told* by others as well, as a kind of visual literacy skill. For the younger children in the group, the introduction of visual icons concretizing human emotions in a way that can be described and talked about objectively seemed particularly helpful as it allowed for them to learn more about their own emotions and think about the causes that helped to produce those. For example, when Child 2 on line 45 responded correctly *'responded* to my question of why the character icon with the red face was feeling mad, the follow-up questions *'o my quest 'What color is it?', 'What makes your skin red?', 'What do you call this?', 'When you're mad, how do your eyebrows go?'* aimed to elicit more vocabulary words and through further question-answer call-and-response cycles, highlight more connections between human emotions and body/facial expressions (*'Red', 'When a mosquito bites you', 'Your skin gets mad', 'all your blood goes to your face', 'you see how the eye', 'Eyebrows', 'Frown'*). This process of posing open-ended questions (*'What makes you think he looks scared?', 'Do you ever look sad?', 'What makes you look like this?', 'What makes you feel happy?'*) allowed children to not only learn to recognize and name particular emotions but also to begin exploring the cause and effect relationships behind these emotions, thereby learning things about themselves and how to share them with one another (*'Sam says he (is sad when) eats something bad', 'I feel happy when I run really fast', 'Playing outside', 'Playing with toys'*).

Although it is difficult to ascertain the full impact of the workshop (as many vestiges likely emerged at-home or after the sessions ended), it was my sense based on my observations in light of parents' interviews that the impact of the UGP on social participation, emotional understanding and literacy behaviors was most pronounced with those children whom parents were concerned about in terms of their literacy or social-emotional well-being. In the case of Sam, Solibren's motivation for joining the workshop was informed by her desire to work on his social skills (*"Really want to develop how to play and be with others. That's my number one concern right now. It's teaching him how not to hit. How not to hurt. Being gentle."*) which the workshop provided many opportunities for him to interact playfully and emotionally with others in a safe and supportive environment, as evidenced by him joining Olem during her *Scratch Dance* presentation, for example. Another example is the case of Arfia. Her mother said in the entry interview that she needed motivation in cultivating interest in acquiring literacy skills because unlike her older brother who benefited from the presence of a father which allowed them to dedicate more time in his early literacy skills development, in Arfia's case, she is at this stage of development at a time when her parents are divorced. Therefore, there is less time for Alcanat (as a single mother) to dedicate to Arfia's early learning needs. The alternative embodied and multimodal nature of the f2f/digital activity of rhythmic communication seems to have motivated those children with higher literacy and social-emotional learning needs than their counterparts doing better in those areas. For children like Arfia and Sam, the fun, embodied and sensorimotor mode of the workshop allowed for greater options of participation and was a greater source of motivation to engage in literacy tasks like alphabet learning or word spelling (as when *Sam picked up his card exclaiming jubilantly "S, that's mine!"* or Arfia requesting to use the drum instead of her body to share the rhythm for her first initial). Both of these cases show the

intervention can be effective for those children in need of additional, alternative or special means of support.

Together, these findings help us to reimagine modes of early literacy practice made available to children of varying ages and levels of development, including the introduction of embodied learning coupled with digitally-mediated concepts, processes and possibilities of communication and expression. Despite these findings, there were several challenges that were encountered along the way. Mainly of central importance here was the need for me to juggle multiple roles, namely: as *performer*, rehearsing, presenting and sharing knowledge from a cultural repertoire; as *lead guide*, orchestrating the workshop space and modeling activities for parents to guide their child(ren) in turn; as *répétiteur*⁵ (or tutor), providing coaching and rehearsing directly with children; as *participant-researcher*, observing while passively collecting audio and video data; and finally as *technology designer*, operationalizing and troubleshooting the tools and instruments designed to investigate the central research questions on the potential of embodied learning for developing children's multimodal literacies. I have also discussed the central role that the *UrbanGriot.org* online platform was intended to play in bridging children's access to the tools and resources from home in between workshop sessions, and the challenges in implementing this strategy based on parents' reluctance of having the children engage with technology or online from home. This could have perhaps broadened the children's grasp of multimodal literacies, covered a larger portion of resources, and helped to strengthen sense of community by having more artifacts to share.

⁵ A *répétiteur* (from French verb *répéter* meaning "to repeat, to go over, to learn, to rehearse") is an accompanist, tutor or coach.

Chapter 6 – Findings from Entry Survey, Interviews and Focus Group of Focal Parents

I describe in this chapter the insights gained from the data collected from the parents, namely the online parent survey questionnaire on child multimodal literacies, entry/exit phone interviews, my workshop observations and the final focus group. I organize the chapter beginning with the pre-workshop survey results related to children's multimodal literacies and interviews with parents. Following this, I share the analyses of the session observations that led to the findings and close with affordances for consideration in designing multimodal literacy community-based family learning experiences, based on the final focus group discussion. In doing so, I address my final research question on the potential impacts of such interventions on children's survey results related to: What kinds of learning experiences were parents motivated in being exposed to when seeking to participate in music or arts-based opportunities? What did they hope to learn/gain for themselves and for their children? And finally, what is involved in designing multimodal literacy learning experiences that can be sustained over time through parental engagement?

One finding is that the use of this approach to introducing early literacy skills can provide parents with an alternative method for *planting good seeds* and monitoring a child's development and planning timely intervention, although this only holds for parents who resonate with the approach.

Another finding from my observations is that by having parents as participants allowed them to cultivate their identity as enablers of children's multimodal experiences. Conversely, some parents were also observed to play an *inhibiting* role in mediating children's experience of multimodal literacies, an aspect which I attribute to a combination of their parenting style, assumptions about play versus literacy learning, and policy on technology use.

A fourth finding is that the cultural aspects of the curriculum (activities and norms) were found by all parents to be very beneficial to the social-emotional development of children, given more *consistency*. Evidence of this emerged during the final focus group.

Entry Surveys and Interviews

In contrast with other music or arts-based programs they may have attended, UGP parents were expected to complete a pre-test, post-test, entry interview, exit interview, preliminary survey and final focus group reflecting on their use of the workshop resources with their child at home. As such, the study requirements introduced a layer of accountability, commitment and responsibility that was foreign to many of the parents. Although all the parents read and signed the consent form agreeing to participate in this study on early literacy acquisition that introduces them to embodied learning instructional and play strategies and tools, some of them failed to fully participate in the research process by either not completing one or several of the data collection instruments or by not participating in the online space or exit interview.

The data collection process was organized in a way that would allow participants to provide the researcher different levels of information. The survey, entry/exit interview and focus group questions were designed to explore the multiple elements within an activity system (see Table 7).

Table 7 – Survey, interview and focus group questions based on activity system elements

Activity System Element	Method	Question or Prompt
Subject	Survey	What is your child's month and year of birth? How much does your child like to draw or paint? How much does your child like to sing or play music? Does your child play an instrument? How much does your child like to play video games? How much does your child like sports? How much does your child like acting? Does your child like to watch TV shows or movies? Does your child like to read books or be read bedtime stories? Which artists or what genre of music does your child like to listen or dance to? What are some of your child's favorite movies or TV/online shows?
	Interviews	What are some words that describe your child? Does your child read? If so, when did your child start to read? What was it? Does your child have difficulties reading? what do you think are your child's strengths? what do you think are your child's difficulties, challenge areas or pain points? What do you think are your child's abilities and aptitudes that should be developed?
Object	Interviews	Why did you decide to join the study? What are you hoping to gain personally? What are you hoping your child will gain?
	Focus group	What are your thoughts/perspectives with respect to this approach (i.e. rhythm-language connection through the Alphariddims code and the technology, even though you haven't had as much engagement with that). Do you see any value, promise? Do you see any problems in the ways it is implemented right now? In what ways can this enrich the lives of children? In what ways can it transform education?
Tool	Survey	Has your child demonstrated the ability (even a little) of using any of the following? (pen, keyboard, phone, camera etc.)
	Interviews	What does your child play with? In what ways did your child engage with the platform from home? Please explain.
	Focus group	In what ways did any of the workshop curriculum (drum communication, alfariddims, embodiment, drum talk) come up at home at all?

Community	Interviews	Please describe family context. With whom does your child play? Is/Has your child been in any other music or arts-based program? Does your child participate in social activities with other children? Which ones? Where?
Division of Labor	Survey	How often do you read books with your child? How often do you sing, play music or dance with your child?
	Interviews	What is your partner's role in your child's life? What are you doing/have you done to encourage these aptitudes?

A total of 5 parents completed the entry survey questionnaire (Solibren, Olivest, Malabri, Finora and Xyroche). One parents (Xyroche) had two children in the workshop, and two parents (Finora and Xyroche) ended up not completing all four sessions, so therefore were not part of the focal cohort. In addition, one focal parent (Alcanat) did not complete questionnaires for her two children, Cam and Arfia. The survey results are reported in Table 8 below (see Appendix F for full survey questionnaire).

Table 8 – Entry Survey Results

Participant	Child	Age	Vocab/Freq	Visual	Aural/Oral	Music	Instrument	Genre	Gaming	Sports/Freq	Sports	Sport	Acting	Watching	Favorite	Reading	Reading/Freq	Music/Dance/Freq	Story	Multi-literate/Lit Skills
Solbrein	Sam	39	5	5	5	6	0	jazz, cumbia, punk, rock n roll, banda y rancheros, hip hop, Disney soundtracks and "childrens music."	4	6	0		4		6 PBS Kids shows and lots of animated movies	7	5	3	3	6 2 Pen, Photo
Olivest	Olem	40	4	7	7	7	0	Variety	4	6	0		4		5 Mister Rogers, School House Rock	7	5	3	3	6 4 Pen, Photo, Phone, Keyboard
Malabri	Machi	26	4	7	6	0	0	Folklorico music, Ronettes	5	3	0		5		7 Bumble-nuns, Peete the cat, Youtube videos	7	5	3	3	5 2 Phone, Pen
Finora	F	31	5	5	7	7	2	Piano, Ukulele Children's music, bluegrass, pop, reggae, jazz, classical	4	4	0		4		7 Peete the cat, Youtube videos	7	5	3	3	7 5 Pen, Photo, Teatig, Keyboard, Song
Xyroche	X	82	4	7	6	0	0	Raffi, Casper baby/pants	5	5	1	Baseball	6		7 Land Before Time, Transformers, How to Train Your Dragon	7	5	2	2	6 Pen, Keyboard, Phone, Camera, Mariell, Movies
Xyroche	R	56	5	6	7	0	0	folk music, classic rock, kids music, classic country (cowboy), hip hop,	4	6	3	Gymnastics, Taekwondo, TBall	3		6 stinky and dirty, Peete the cat, cowboy documentary for kids,	7	5	3	3	5 Pen, Photo, Camera, Mariell, Song

The first set of questions parents were asked concerned their feeling about their child's vocabulary, oral/aural and visual skills at this age. Three parents said that they felt 'Very Good' (5) and three said that they felt 'Good' (4) about their child's vocabulary growth at this age. The same number of parents said that their child like to sing or play music a great deal (7) or a moderate amount (6), while half the parents said their child likes to draw or paint a great deal (7), two parents said their child likes to draw or paint a moderate amount (6) and two said their child likes to draw or paint a little (5).

All the parents said that their child likes to read books or be read stories a great deal, and that they read books with their child a great deal, as well as often sang, played music or danced. When asked if their child had *demonstrated the ability in any of the suggested literacy tools* (see Survey Questionnaire in Appendix for full listing of options), the most common answers from parents were: Pen, Phone and Keyboard. Furthermore, only one parent mentioned their children playing an instrument (Piano, Ukelele). These answers suggested that drumming as not part of the musical skills most children already possessed, although some did (as in the case of Olem of whom her mother reported during the entry interview that she was introduced to Taiko drumming pretty early on, as both her and her husband were part of a performing group in Mt Shasta). This further suggests that, prior to the workshop, none of the children considered the drum as a communication tool, in the drum language sense. Nonetheless, these responses indicated how the children's existing aptitudes could be leveraged in the design of the *Urban Griots* learning environments and activities with the goal of motivating and stimulating their multimodal literacy and socio-emotional skills development. For example, in the facilitation of the Scratch Dance activity, my goal was to leverage a skill or knowledge that the children already possessed to develop a skill that few or none of them had (like using the phone to retrieve known music with the help of the parent in order to choreograph a dance). This activity also built on the basic rhythmic gestures acquired through their prior practice with the *Alphariddims* symbol system.

During the entry interviews, when asked about their intended outcomes in joining, both for themselves and for their child (*why did you decide to join the study? What are you hoping to gain personally? What are you hoping your child will gain?*), the most common answers from parents were socialization (i.e. being part of a social group for the children to meet and play with others) and learning music as part of their child development or as something they can practice in family.

Finding 1: Providing means for parents to encourage and evaluate children's alphabetic learning

While parents might think their children's aptitudes and literacy skills are 'good' or 'very good', the reality is that they don't always know how to assess those skills, nor the best ways to stimulate an interest in reading in their children. Parents reported that the pre-test was their first opportunity to present alphabet letters to their child in a sequence ordered differently than the typical alphabet song. In addition, the entry interviews revealed that some parents think of reading strictly as decoding letters and reading word for word out loud one page after the other. In this way, Solibren described her idea of reading with Sam as "practicing sounding out words or reading the title of a book over and over. Memorizing titles, words." (Solibren). However, Sam only scored 3 correct letters on the pre-test. Other parents think of reading in terms of memory and information recall, as in Alcanat's case: "both have a really good memory from a young age about 2 years old. Cam would be reciting the stories that we read. She does the same

thing. They can hear it a few times. They just know the story.” Similarly, Arfia knew none of her letters, although according to Alcanat she could memorize and recite stories.

These conceptions of reading held by some parents (*reading as sounding out* or *reading as memorizing*) connect to the kinds of conventional tools and activities they are inclined to use in helping children develop their abilities and dispositions regarding reading (like books and bed time stories). Due to these perspectives on reading, none of the focal parents reported to have used music or technology as a tool to support reading prior to nor during the intervention, which includes the online resources made available via the UrbanGriot.org platform. This was a serious drawback to the present study given the gap this created in terms of telemetric data collection, which would have provided more conclusive evidence regarding the impact of the techniques designed for teaching literacy (letters, word forms and spellings). As this reluctant attitude towards technology is not uncommon in rural areas like Mount Shasta and Dunsmuir, uncovering the reasons for suburban parents’ lack of engagement with digital tools would be useful for the research, in general, as it would inform the redesign of the UG workshop and digital experience in ways that better exemplify their intended context and embodied ways of engaging with digital activities and tools in fun, multimodal and social ways. This could inspire these parents to expand their repertoires of literacy practices in the ways suggested by the *Urban Griots Playground*.

The UG family workshop model views the relationships built with parents as essential drivers of children’s early literacy acquisition, through motivation, modelling, support and evaluation. Consequently, a goal of the workshop was to have parents reflect on and further cultivate their repertoires of literacy practices in ways that would enrich their everyday interactions with the children and increase the number of opportunities for children to practice literacy skills (through embodied play, music-making or via technology) whether at-home or in the community. In addition to probing about characteristics of their child’s multimodal literacy abilities, learning styles and play routines, the entry interviews helped parents reflect on their current practice to support improvement (*What do you think are your child's abilities and aptitudes that should be developed? What are you doing/have you done to encourage these aptitudes?*). Parents’ responses varied in terms of the strategies they used to deal with emotional or social problems, with mixed results. Strategies ranged from *disciplining* (Solibren: “Also disciplining him. I've been talking and it's just been going over and over, so I've decided it's time to go further”) to *supporting* (Olivest: “If she's triggered, really upset, we try to give her space as much as she needs, and offer some tools she can use to calm herself down. Process the emotions”) or *modelling*. As the mediator of the activity for each child (as in Excerpt 5.1 described in Chapter 5), the parents played a key role in modelling the tasks correctly in this context, which provided them with an opportunity to develop their own ability of using embodied play, music and digital tools to support and encourage children’s development of multimodal literacy and social participation skills, as well as emotional understanding.

Finding 2: Parents as participants and enablers of children’s multimodal experiences

The UGP workshop provided parents with ample opportunities to take a leadership role in mediating the embodied, literacy and digital tasks intended to support children’s multimodal meaning production. Not only did the circle organization provide everyone (parents and children) an equal footing and window of participation into the UGP community of practice, it allowed parents to present themselves to the children as learners themselves, exploring together a new culture, language mode and system of communication, and having fun doing so. The fact of

witnessing their parent lead and participate in the tasks with them (rather than myself) allowed children who were normally shy (like Sam or Arfia) to feel more comfortable in attempting the activities themselves. This in turn enabled them to feel more confident and comfortable in expressing who they are when it came time to share with the whole group. An example of this occurred during the final workshop culminating activity involving Arfia and Alcanat:

Excerpt 6.1 – Final workshop culminating circle activity

Alcanat holds her hand and walks her to the center of the circle. Picks up the A card from my hand and places it on the floor. Cam crawls over to read the card.

1. Arfia: I want to do it on the drum
2. Alcanat: She wants to play the drum
3. Pierre: Oh you want to play it on the drum? We'll do that next.
4. Arfia: *(Squirms as Alcanat holds her hand)*
5. Pierre: If you don't want to do it, it's ok.
6. Alcanat: *(Sits Arfia on her lap, holding her hands)*. Tone *(makes Arfia slap her thighs)*. Base Base *(makes Arfia lift and stomp both her feet)*
7. Arfia: *(Laughs)*

Arfia's request "to do it on the drum" (Line 1) reflects her motivation towards using the drum to accomplish this embodied task. Rather than enforcing the rule that everyone *had to* share, in my role as tutor I aimed more to give children the opportunity to learn about the conventions of social participation in a group (like turn-taking and ordered process) while preserving their freedom to choose whether or not to participate (as in Line 5), although not necessarily how to participate (Line 3). By sitting Arfia on her lap and completing the task as a duo, a bonding moment occurs as mother and daughter are moving as one body to express Arfia's first initial in *Alphariddims* (A: · xxx). Arfia's laughter in this case is significant, because although the culminating activity did not go according to her wish (doing it on the drum), she found it to be enjoyable nonetheless, perhaps by virtue and recognition of the multiple ways of participating in this single task, either by herself using her body, with the drum or with her mother using her as a drum.

Another example of parents playing an enabling role in mediating children's multimodal literacy experiences was in the case of Olivest transcribing her entire name spelling into *Alphariddims* (see below) and practicing embodying it with her a number of times, thus reinforcing Olem's knowledge of the names of the visual symbols (base, tone, slap), their corresponding pitch level (low, medium, high) and rhythmic gesture (stomp, slap, clap) as well as the letter in her name associated with each sequence pattern.

Excerpt 6.2: Example of first name spelling using *Alphariddims*



This particular sequence would be embodied by a series of body movements matching each term in the pattern with its corresponding rhythmic gesture, i.e.:

O: <clap hands - clap hands - clap hands -stomp feet>;

L: <clap hands - slap thigh - slap thigh - slap thigh>;
I: <slap thigh - slap thigh – stomp feet – stomp feet>;
V: <slap thigh - slap thigh - slap thigh – clap hands>;
E: <slap thigh - stomp feet - stomp feet - stomp feet>

This multi-layered, multi-modal way of approaching naming not only stimulates children's cognitive abilities (by engaging symbolic understanding, pattern-matching and letter recognition skills), it also leverages their embodied knowledge towards verborhythmic production of meaning. By exposing parents to this different way of introducing alphabet letters to children in an embodied and rhythmic way, the workshop enhanced parents' repertoires of literacy practice while positioning them as play partners with children, which creates a unique familial bond beyond the literacy and socio-emotional objectives of the workshops.

Finding 3: Reconciling the tension of parents as inhibitors of children's digital experiences

The challenges presented by parents' conceptions and perceptions of learning, play, collaboration and parenting came in a variety of forms. Solibren, for instance, during the culminating digital activity in Workshop 4, insisted to Sam "Ok, I'm gonna hold it. I'm gonna hold it while you try it," thus effectively micro-managing the learning process away from him and restricting his play and exploration of the tool. If parents simply approach digital tools as something to 'get right', then that's not going to be a foundational and motivational experience for children to learn how to read and develop multimodal literacies in the deepest sense of the word. Reading to their children should be a bonding experience where parents showcase their creativity and create a personal intimate ritual of storytelling with their children.

The *Alphariddims* app differs from most other apps by virtue of the fact that it assumes users' participation in the type of embodied rhythm and communication experiences that parents and children are exposed to in the *Urban Griot Playground* and therefore is not just another learning app or game, per se, but more of a digital learning extension of the workshop's embodied multimodal literacy practice intended to show participants more physical experiences related to communication, meaning-making and bonding around language learning as there's not enough of them. So that ritual element around literacy is primarily what I was trying to introduce in the workshop and reinforce through the app. But it was very hard for parents to trust that message because they may have had a misconception about what literacy learning, play and culturally-grounded educational technology is.

While some parents are finding value in and making pragmatic use of learning apps, there are a lot of basic learning apps that are just rote and response, recognition and recall. But people only understand what they have experience with. And the more they have a certain kind of experience, the more they understand it. Some of the biggest challenges encountered were the issue of gaining trust from parents, as well as their perceptions of the purpose of the UGP which affected their level and style of participation. While half of the parents reported that UGP was their child(ren)'s first experience participating in a regularly scheduled early literacy-focused structured group learning activity, the other half reported having had prior experiences with music or arts-based related program, like story time at the library or music and movement (another parent-participation class to help children learn self-regulation and love of music, singing and dancing). Interestingly, only half of the parents who began the workshop completed all four sessions, all of whom had prior experiences with music or arts-based related programs. For those who did not have prior experiences and ended up not fully participating in the UGP's

hybrid ecology of learning, it would be useful to learn about the reasons for their non-participation, whether this was due to sickness or time constraints (as suggested by one of the parents) or instead to a lack of trust in the pedagogy. This disengagement on the part of the parents (whether conscious or unconscious) does present a barrier to children's full access to literacy experiences that could prepare them for the challenges of more advanced learning or schooling.

Focus group

For the final focus group discussion, held after the post-test at the end of Workshop 4, I was interested in probing focal parents' perspectives on the impact of these rhythm-based activities and technologies introduced in the workshop, asking them to speak on what transpired at home, and reflecting as a group on what this workshop experience could mean for early education. I summarize below the parents' answers to each question framing the discussion, which lasted about 20 mins:

Question 1: *In what ways did any of the workshop curriculum (drum communication, alphariddims, embodiment, drum talk) come up at home at all?*

Malabri – “Machi started making music using various improvised objects (like his cars, for example). He also started celebrating people's achievement a lot more, or somebody's doing something good, like when he sees a baby (didn't use to clap for anything before, so that was interesting). He's also been singing the *Ashe* song, and then my husband started singing it. He never sings, so...”

Alcanat – “there's a little apprehension of something they think they might enjoy but they're a little less inclined to do it in front of other people that they're not so familiar with, but when they're at home and I was making dinner, they were playing, and then I heard them with the stack of the cards, and I heard them over there with the 'BOOM', 'CLAP'. They were going through them and kind of playing with them on their own. Just playing with it. Something fun to do with each other. They do enjoy games, but just sometimes they maybe feel like they're on the spot, when they're looking and there's eyes on them. It's not that they don't like it, it's just that they're not so comfortable in the environment yet. They were singing that song about a week or so ago at the beginning of dinner.”

Solibren – “Sam sang that song at home too.”

Question 2: *What are your thoughts/perspectives with respect to this approach (i.e. rhythm-language connection through the Alphariddims code and the technology, even though you haven't had as much engagement with that). Do you see any value, promise? Do you see any problems in the ways it is implemented right now? In what ways can this enrich the lives of children? In what ways can it transform education?*

Alcanat – “I like the concept. Some of the activities and ways it was structured was maybe for a slightly older age range. For a lot of the activities it's like we're herding cats in here. It's just madness. Maybe try to factor in more the attention span of the children in the early ranges, and if there's any adjustments that could be made in the presentation for that.”

Solibren – “It was lack of consistency for us. For me to see the effects of the curriculum I would have to do it more at home. In here it’s hard to concentrate, which is fine, but it’s like a different way of learning. I don’t know if it’s too many people. I don’t know. But I think the curriculum is really dope! I really appreciate the cultural perspective and being able to unlearn the things that we’ve learned, and to see how it will play out. I was thinking more social literacy, for him, for us. It’s just like 4 weeks that we’ve met and there were several instances where I was able to see his development in like how we interact with one another. Because in other groups that we go to, it’s not as intentional of like, “Ok, we’re going to watch this person now, perform. And we’re going to listen. And we’re going to applaud. We’re going to just see each other.” And I think that that was pretty powerful for us.”

Malabri – “I really liked the social aspect as well. I liked that the letter representation was very physical because when I learned an instrument later on, it was really hard to have an instrument in the way. Like right way. I think I could learn better using my own body, because I can take it with me. That was really good for Machi too.”

Olivest – “I really liked the idea of the curriculum. The cultural aspect of it. The literacy. The rhythm. One of my goals for Olem is to broaden her world, in any way I can, to expand it. I felt like this series planted some nice seeds for that, and I don’t know that I would say I’ve seen a huge difference, because she tends to be musically-inclined anyway. Really likes rhythm, music, dancing anyway so I don’t know if I’ve really seen too much of a difference at home other than her spontaneously wanting to do some of the exercises like Zip Zap Zop or some of the songs and stuff. It was nice to plant a seed about symbol association. You can associate literacy with music and these different connections that you can make. And not just “Oh reading is just these letters”, but it can incorporate other aspects to it. I really enjoyed that and thought it planted some seeds for that. I really appreciate that. I would agree that some of the exercises were maybe a little bit advanced for her. I think she was not quite ready for it. But maybe in the near future she will probably be able to have more focus, energy. But overall I thought it planted some good seeds for her.”

Finding 4: Expanding possibilities of literacy and social activity through cultural awareness

As the answers above show, while most parents found the cultural and social aspects of the curriculum to be effective for children of this age, they also felt that in its multimodal literacy aspects, the curriculum was a bit too advanced for the children’s level. Practical suggestions were also made on how to improve the workshop facilitation and presentation of information in ways that would resonate more with how children at this age acquire and organize information (e.g. displaying the session schedule as a sequence of pictures illustrating each upcoming task for the day). Nonetheless, the cultural and social play activities (like singing the *Ashe* song, embodying letters rhythmically using *Alphariddims*, Zip Zap Zop) as well as the subtle social norms and conventions of the workshop were found to leave the strongest vestiges that re-emerged in the home context.

The only instances that were mentioned in response to my question *on the ways that any of the workshop curriculum came up at home at all* were spontaneous activity initiated by the children themselves (like Cam and Arfia playing with the *Alphariddims* card deck before dinner), and sometimes leading the parent (like Machi breaking into the *Ashe* song and eventually getting his father, who never sings, to join). As meaningful as this report is to the impact of the workshop on children’s family relations, it ties back to the previous findings on the dual potential

of parents as *enablers* or *inhibitors* (or yet again, *passive observers* or *active engagers*) of children's multimodal literacy experiences.

In light of these observations, it would have been useful to see what the full impact of the workshop would have been, had the parents better connected with the UGP pedagogy and made more intentional use of the physical (*Alphariddims* cards, handbook) and digital (*Alphariddims* app, *modules*) resources provided via the UrbanGriot.org platform. With additional consistent reinforcement at-home in between sessions, it would have been much easier to manage and achieve the goals of each workshop session, rather than having to constantly start over each time due to various absences and the information not being remembered or independently rehearsed by the parents with the children from week to week, as was explained by the procedures provided in the consent form. The theme of *consistency* which emerged from the focus group is evidence of this. Since they thought the materials were not age-appropriate, perhaps it did not make sense for the parents to try to reinforce the UGP approach at this time. In informal conversations, some parents said they felt their child could potentially benefit from the workshop some time down the line.

Exploring implications for parenting

In this final section, I will consider some implications for parenting. In order to help children, improve their literacy skills, parents need to know something about the structures and symbolic functions of language, and how symbol systems are acquired by young children. They also need to know about other cultural practices and tools related to literacy and communication, beyond the pen, phone and computer keyboard. This can be especially important for children "at-risk" of not acquiring the prerequisite literacy behaviors and skills within the prime time window for this foundational learning (ages 3-5). The more parents know about embodied multimodal practices that can enhance the socio-emotional bond between them and their children the more opportunities children will have to practice key literacy behaviors and skills. Results of the *Urban Griots Playground* workshop model provide a basis for identifying early children whose literacy development require special attention. Parents are invited to explore ways to help these children develop core literacy competencies. Similarly, in order to support children's socioemotional development, parents need to know something about different cultural frameworks and approaches to socialization and the importance of group play in modelling and practicing social participation skills to gain emotional understanding. In this too, the UGP model provided much in terms of inspiration, notably in its uptake of traditional play practices from the trans-African cultural universe of initiation exercises in systems of knowledge, using body rhythms, drum communication and digital drum talk.

Influencing parenting decisions

Based on the results of the UGP study, parents can think of their child/children as falling into 3 groups: 1) those with an already complete alphabetic knowledge who bring rich language to reading and writing tasks, 2) those with average skills who need attention to make sure that their literacy behaviors and skills increase as language demands through social interactions at-home, in the community or digitally-mediated increase, and 3) those who need extra attention and more exposure and enriching conversation with competent adults, concurrent with

stimulating face-to-face or digitally-mediated embodied learning interactions with comparable and more advanced peers.

All children need opportunities to talk with adults and with peers in a variety of social settings. As homeschooling parents learn more about the literacy behaviors and socioemotional understanding of their child(ren), what can they do to support their development in those areas, especially for children who may need special help? When I set out to conduct this study in November 2019 and engage families in embodied, multimodal learning activities rich in voice, rhythm and movement call-and-response, I aspired to lay a foundation for the hybrid (face-to-face and online) ecology needed to support this work beyond the 4 weeks of the workshop, with full expectation that this infrastructure would be revised and build upon in the future to reinforce parents' existing homeschooling curriculum and provide virtual play-based learning experiences for children. What I did not know was that the COVID-19 pandemic was imminent, and would in its wake force nearly every institution of learning (homeschooling families included) to have to pivot sharply from in-person experiences to distance learning. For parents not prepared or reluctant to engage with technology tools (as those in this inaugural workshop cohort), this is sure to present several challenges during this time of great change. When selecting learning apps, virtual games and other digital tools for support their child's learning, parents will want to know if the app is below, a fair match with, or above his or her symbolic understanding. The *UGP* model helps parents think about children operating with basic functional understanding of symbols, those operating with average-for-age symbolic understanding, and those who control more complex symbol systems. This information will be useful in making multimedia (not only books) choices for individual children. The UGP model also helps parents think about introducing rhythm-mediated symbol system as an alternative communication mode, especially to a child who, for whatever reason, does not have good control of symbolic understanding, which is the foundation for later language skills. Parents can give the child opportunities to engage with the symbol systems and literacy practices that will be needed when reading and writing text. Talking with the child about what symbols mean (and how to embody them through dance/movement or represent them through music/rhythm) is another way to support literacy development and promote literate behaviors in the early years. The question at this time of remote instruction and social distancing is how to design and deliver resources that blend music and language activities into virtual assets that can be adopted by the (vastly expanding) homeschooling community.

Chapter 7 – Culturally-grounded embodied learning ecologies by design: Discussion of Insights from the Urban Griots Playground

Contributions of the Research

The *Urban Griots Playground* research has resulted in the design and implementation of a digital talking drum communication system to stimulate literacy behaviors in children ages 3-6. The components of the system, from its material interface (*Drumball*) to its use of a rhythm-mediated visual symbol system (*Alphariddims*) were chosen to optimally integrate children's embodied knowledge around voice, rhythm and movement to support social engagement and emotional learning. Evidence for the validity of the UGP culturally-grounded embodied learning approach has been provided in three ways. First, the exploration of a visual symbol system as a multimodal resource for embodied communication was demonstrated by focal children. For example, vocal, rhythmic and kinesthetic abilities of children were used to design, conduct and assess literacy practices through the production of rhythm-as-text. Second, during the circle practice workshop segments, key social participation dispositions were observed, as evidenced by several children spontaneously joining in while others were sharing. This multi dominance in improvisation is a feature of trans-African cultural systems (call-and-response), that can serve as a powerful strategy for organizing the participatory structure of learning in ways that engage socializing skills. Third the involvement of parents as social and learning partners made these sessions highly interactive literacy events and provided children with many opportunities to form stronger family bonds with others as well as increase their emotional understanding of themselves (through the *Emotion Faces* activity, for instance). Activity across the multiple sessions worked to strengthen the bonds already existing within this homeschooling group, as some children (Olem and Machi) started their own play dates which extended beyond the study period.

The workshop plan in Appendix A with the resources provided online will support the dissemination and integration of the embodied/digital literacy activities based on the *Drumball-Alphariddims*. The parent workbook, modules and algorithm script files are provided to registered members on the UrbanGriot.org website, and complete instructions for constructing a lightweight and inexpensive *Drumball* from improvised materials will be provided in the near future. A framework for recreating the UGP learning ecology is provided in Appendix J for organizations, schools and community agencies interested in designing powerful embodied/digital play-based learning environments within early childhood settings.

Design Principles

A central design conundrum that had to be resolved in preparation for the study concerned the algorithm employed by the system for transducing rhythm into text. On one hand, given the focus of the research question on the tool's impact around aural/visual literacy skills related to letter naming and word spelling (which are graphological processes related to visual information about words and text in print, i.e. letter sequences), there arose a need for an alphabetic scheme whereby rhythmic patterns could represent individual alphabet letters. This had far-reaching implications for the rest of the design of the activity and learning ecology, like the use of *Alphariddim* letter cards or the *Body Riddims* scaffolding activities that involved decoding rhythms as letters and encoding letters as rhythms.

On the other hand, a syllabic scheme that is grounded in the authentic drum language communication paradigm would rely on the prosody of complete spoken utterances (instead of

their alphabetic content) to produce verbal meaning, which is how talking drums actually work. While the *Alphariddims* game levels used for this study used only an alphabetic scheme of rhythm-to-text transduction, future studies will look at the impact of the syllabic scheme as well, to see what difference this choice of transduction scheme makes in terms of balancing graphological and graphophonological processing skills, as there are only 26 letters of the alphabet, but 44 phonemes (unique sounds) in standard English, which is often a point of confusion for young children learning how to read.

Recent early literacy research emphasizes the need to teach phonics explicitly, systematically and at the level of automaticity (i.e. where decoding becomes habitual) by integrating multi-sensory (auditory, visual and kinesthetic) activities and information communication technologies to enhance teaching and learning by accommodating different learning styles and activating multiple senses (NSW Department of Education and Training - Learning and Development, 2011). Under a syllabic rhythm-to-text transduction scheme, the *Drumball-Alphariddims* embodied learning rhythm-mediated approach could provide a viable path for enhancing phonics instruction by facilitating tapping out drum sounds to represent phonemes in sentences or coding one's body to make letter shapes and sounds. Perhaps a more fully tangible interface will lead to more conclusive results. Clearly, the choice of an alphabetic versus a syllabic scheme bears implications for the continuation of the design research, as they have ramifications on the implementation of the tangible interface and software application, and how to introduce them through instruction or human-computer interaction.

Avenues of Future Research

One avenue for future early childhood literacy research supported by the present learning ecology and digital tools is the opportunity to investigate *capoeira* as a theoretical context for further refining the theory of digital orality, by virtue of its richness in voice, rhythm and movement. By engaging with other children and adults in embodied routines and creative collaborations involving singing, music and dancing through activities such as capoeira, children become prepared for later participation in related multimodal literacy events. Continual use of rhythm as part of the sonic and transactional landscape of the learning ecology was critical to the creative and collective work of practicing multimodal literacy skills. From the moment parents and children walked into the workshop space, they heard drum rhythms in the *capoeira angola* music that was playing, accompanied by group chanting. Throughout the sessions, drums were used to teach and learn about African culture and history, musical techniques, language and communication concepts and dance/movement sequences. The flexibility (in terms of physical use) and immediacy (in terms of sound production) of the percussion instruments made connections between learning moments fluid, supporting young learners in being self-directed and inviting to participate with their whole self. Furthermore, children used the drum alongside literacy tools found in the UGP space, such as visual symbol cards, paper and pen, mobile phones, tablets, Bluetooth speakers and video projector. Beyond this, it is possible to design digitally augmented environments where the rhythms produced via the body, drum or other instruments (like the *berimbau*) are interpreted and computed as calls that produce meaningful multimodal changes within the telematic space of the activity. Future versions of the app could combine smart computer vision algorithms and augmented reality to use a regular drum (or other improvised surfaces) as a multimodal rhythm-mediated communication tool. Similar environments have been designed around embodied narrative improvisation in VR (Jacob, 2017).

Another avenue for this system to advance early childhood education research is its ability to be used didactically across various contexts. For example, access to the digital corpus and activity modules from home allows those parents registered on the UrbanGriot.org platform to involve siblings and extended family in learning the concepts and improvising new kinds of literacy events that involve singing, drumming and dancing. Or with the *Alphariddims* app installed on a personal mobile device, children can accelerate their acquisition of alphabet letters and vocabulary words through embodied computer interaction from anywhere. From such a framing of the Drumball-Alphariddims as a distributed multimodal embodied learning system, parents can integrate the UGP's *digital drum talk* rhythmic communication practices as part of the literacy events that take place in the home (or other out-of-school contexts), as this mode relies on the simple and easily accessible use of rhythmic patterns performed with the body, drum or mobile drumpad interface. Providing access to digital tools and online resources does not guarantee that parents will be on board to use them or agree on their pedagogical value (as the UGP study is evidence of), yet data records documenting information about children's various multimodal literacy and socio-emotional competencies can be important resources to communicate individual progress, identify children who might need additional support and plan timely intervention strategies, whether these strategies themselves involve digital practices or not.

Well-documented assessments of children's development and experiences are invaluable to both families and the program, and as new informal, out-of-school and virtual learning spaces emerge, keeping track of children's developing multimodal literacies is key. To minimize reliance on parents' to monitor children's learning in the context of engaging with the *UrbanGriot.org* online platform and *Alphariddims* mobile app, a telemetric layer is integrated on the back-end to capture all of the activity data of system users. This is basically a database file storing individual players' activity (# play duration, mouse clicks, keyboard/drumpad strokes, # correct letters, # errors, # attempts etc.) through the virtual context of games, modules and digital corpus. These data log files thus provide a complete documentation of children's oral, written and rhythmic productions on various tasks and levels (letters, words), critical achievements (leaderboard rankings) and boss level tasks (proverbs, phrases). It is unfortunate that this virtual context of the learning ecology was not further explored by most participants. This surely would have enriched the findings by providing more discrete data to analyze.

A third avenue of research is around alternative and augmentative communication (AAC) devices for children with special needs. For example, nonverbal children with Autism Spectrum Disorder (ASD – a condition showing a growing trend in recent years) experience major difficulties communicating and socially connecting with others. It has been documented that music therapy may help children with ASD to improve their skills in important areas such as social interaction and communication, and may also contribute to increasing social adaptation skills in children with ASD and to promoting the quality of parent-child relationships (Geretsegger, Elefant, Mössler & Gold, 2014). Research also shows that children at this stage may benefit from Tangible Symbol Systems and other forms of communication tools that support children with disabilities' nonverbal communication (ranging from simple low-tech solutions to specialized mobile/tablet applications). While music therapy, especially rhythm-mediated interventions (like dyadic or group drumming) has proven beneficial to improve social skills in children with ASD, most AAC devices designed to help children with ASD advance skills as they mature (such as speech generating devices, or SGDs) use graphic symbols combinations in

the context of screen -based interfaces, like those found in Picture Exchange Communication Systems (PECS). Framed as a rhythm-mediated augmentative and alternative communication device (AAC), the *Drumball-Alphariddims* system could potentially assist in improving interpersonal/group communication and social interaction between children with ASD and those without ASD. More research with adequate design and using larger number of participants is needed. Hence, a branch of the future research on the application of the UGP model and *Drumball-Alphariddims* system could look beyond the early literacy context of this dissertation study to extend care pathways for improving communication skills and socio-emotional well-being for children on the ASD spectrum.

Observing Children's Developmental Processes

The application of the *Drumball-Alphariddims* system to study children's development (social, cognitive and behavioral) has implications beyond early childhood education and literacy research, in particular. Developmental research has commonly limited attention to either the individual or the environment - for example, examining how adults teach children or how children construct reality, with an emphasis on either separate individuals or independent environmental elements as the basic units of analysis. To fully appreciate and understand children's literacy learning and socioemotional development on a holistic level, we need to regard as inseparable concepts reflecting different planes of focus in sociocultural activity. As a communication system, the *Drumball-Alphariddims* system described here stimulated children's vocal, rhythmic and embodied capacities with others and uses that as a mode of joint action and social interaction. The following discussion on the application of the system in the UGP as an alternative early childhood literacy methodology has been related to three planes of development, namely the community plane (related to their apprenticeship into a community of literacy practice), the interpersonal plane (related to the organization of tasks during embodied learning practices) and the personal plane (in terms of their appropriation and use of cultural tools).

Rogoff (1995) defined participatory appropriation as “the personal process by which, through engagement in an activity with others mediated by cultural tools, individuals change and handle a later situation in ways prepared by their own participation in the previous situation” (3). Meanwhile, “guided participation refers to the interpersonal processes and systems of involvement between people (including cultural and social values) as they communicate and coordinate efforts to accomplish a task” (3), and “apprenticeship occurs on the community plane and is related to the individual's progressively deeper involvement within the institutional values and cultural constraints of an activity” (3). These concepts are used to explicate the developmental aspects of children's multimodal literacy experiences in the UGP study.

Participatory Appropriation

By learning body rhythms, drum language and *digital drum talk*, children learned about the power of their own physicality, which is an important element of effective communication and expression that has long been reduced in conventional literacy learning. For example, during the *Body Riddims* circle activity, children had to internalize the symbol system and make it their own by using it to share something personal to them (their original rhythmic gesture representing their first name initial, as authored by themselves). In turn, children learned something about others by each having the chance to lead the whole group in a call-and-response cycle around

each other's *riddim*. This act of speaking without using the mouth but rather the drum or body as an extension of the mouth expands children's conception of the multimodality of language and communication. For those children who typically struggle interacting harmoniously with others, this communal aspect of the cultural system proved to be very beneficial in seeding prosocial behaviors (as in the case of Sam). This finding showed evidence that use of the *Alphariddims* code as a visual communicative resource that employs rhythm and is deployed through multimodal means (voice, body, drum, tablet) can encourage children's early exploration of literacy behaviors through active social participation.

At the same time the workshop provided parents' with an assessment tool for evaluating children's alphabetic knowledge. This rhythm-mediated application of a symbol system to engage children's reading, writing, speaking, listening and embodied capacities to accomplish multimodal literacy tasks using a variety of tools (body, drum, tablet) across different participation modes (solo, dyad, group) in turn allowed them to practice key dispositions as social actors (caller and responder) and to understand a range of emotions (the thrill of interactive play, the fear of presenting to a group, the sense of achievement from successfully completing a challenge or quest, the comfort of learning alongside a loved one, the joy of celebrating others etc.). During the period studied, UGP cultural tools and practices were reported by parents to have re-emerged spontaneously at various times and had different implications for community/family dynamics and children's at-home interactions.

By grounding the learning experience in the trans-African model of call-and-response using voice, rhythm and movement modalities, the workshop followed a consistent didactic style to present information to children, which resulted in systematic patterns of organization, interaction and discourse, mediated by the (physical and conceptual) cultural tools included in the learning ecology, in ways that children could appropriate them and re-apply later for their own purposes (as in the case of Arfia and Cam improvising a game of *Alphariddims* at home, or Olem spontaneously starting a round of *Zip Zap Zop* or Machi teaching his father the *Ashe* song).

Guided Participation

Sustained and supportive social relationships are essential for children's early multimodal literacy learning. The aim throughout the workshop sessions was to support the children's literacies, multimodal fluency and social participation via face-to-face activities and digital interactions towards the production of a performance organized by the group. Consequently, embodied rhythm-mediated practices were the primary means of stimulating children's learning at the Urban Griots Playground. The workshop activity was structured and directed with the purpose of scaffolding children's emerging multimodal literacies not solely through apprenticing in drum communication practice, but also by paying close attention to the arrangements and interactions between children and parents in the context of jointly interacting with certain tools (*Alphariddims* cards, drums and tablets). The culminating activities were practiced with and enabled by the parents, so the guidance parents were able to provide constituted a key factor in the children's ability to fully participate, and hence optimally benefit from the resources.

UGP used multiple approaches to seed multimodal meaning perception and production via the use of rhythm tools in the four-week study period including visual recognition of patterns representing drum sounds, aural-based tasks to identify the pitch of individual sounds, rhythm-mediated tasks to produce different drum patterns using particular hand techniques, and embodied tasks to produce rhythmic gestures in response to specific drum calls. Embodied learning games and tasks were designed to engage children's sensations (hearing, seeing,

touching) and perceptions of sounds and symbols to provide a context for them to be exposed to key literacy, musical, social and emotional concepts in ways that could be appropriated to support their own spontaneous interactions with others in the environment, or at-home. The UrbanGriot.org platform provided an extension of the learning space for members of the UGP community where parents and children could access supplementary materials and involve friends and family in continuing the embodied/drum/digital talk practices started in the sessions using the *Alphariddims* symbol system to produce more complex meaning (letters, words, phrases/proverbs), play games together, and get feedback on their performance (# correct, # errors, leaderboard ranking).

Apprenticeship

The drum is not just another object out in nature. It has an entire culture and history around its various embodiments and contexts (e.g., drum circles, drum and dance or drum languages), which takes years to master and includes well-preserved modes of interaction as well as knowledge/information transmission. As a communication system, the drum stimulates people's vocal, rhythmic and embodied capacities with others and uses that as a mode of social interaction. Children's participation in the UGP workshop is an apprenticeship in the sense that it is a culturally organized activity that has for its purpose the development of mature participation in literacy activity by the less experienced children in the cohort. In their role as newcomers to the community, children learned about the cultural technologies and institutional structures, practices and goals of drum communication. This involved the recognition of cultural resources and values related to what means were appropriate for reaching the goals of multimodal literacy (such as producing *rhythm-as-text* versus writing), and cultural tools such as visual aids, their bodies, drums and digital tools. The group activity presented challenges (tasks) and involved parents as resources (who, like the children are still developing skills and understanding in the process of engaging in *digital drum talk* activities).

The UGP signature early literacy pedagogy extends the cultural-historical theoretical view of development as a "drama" by using elements of improvisation, role-play and creativity, in combination with multimodality and community and cultural practices, to create a new and different type of early literacy experience that involves personal, interpersonal as well as communal planes of development centered around rhythmic communication.

Limitations

The major limitation confronting any intervention involving families (parents and children) committing to a regular out-of-school activity is the recruitment process. In an ideal scenario, the target sample size for an intervention of the sort would be 20, assuming a few people might not attend. Nonetheless, a small manageable sample size ended up being favorable over larger sample sizes because it allowed the collection of detailed participant data for in-depth qualitative analyses. This data was intended to be augmented by telemetric participant data conserved on the platform. But, due to the lack of available telemetric data (related to parents' reluctance to engage with digital tools), the results cannot confirm the full impact of the UGP distributed sociocultural constructionist learning environment.

Because the focal participants were all from the same homeschooling community that had existing ties, results will not be generalizable. Furthermore, the fact of the intervention period being so short (4 weeks) does not allow any conclusive statements on children's literacy and

socio-emotional developmental outcomes, as this time window does not permit much in terms of assessing observable growth or changes. Although the study did not set out to prove the learning efficacy of the UGP model compared to conventional approaches, it does show that culturally-grounded, embodied multimodal approaches to early literacy practice provide visible behavioral and emotional benefits for children as well as learning opportunities for parents that can be documented and built upon. Towards this end, further research (perhaps of a more formal, controlled flavor), would help illuminate particular areas of interest beyond reading and writing by comparing different media, content areas, contexts and populations in order to bridge the gaps of this initial, exploratory study.

The field of human-computer interaction has opened up new vistas of possibility for new forms of computational media that take advantage of the full range of human physical expression. Surprisingly, despite all of its communicative affordances, the African talking drum has never been investigated as a context for the design of new technology tools that could teach children how to think about the systems of communication and information organization that shape their social world. This dissertation argues that the talking drum is a technology with the same communication *telos* and in the same lineage of innovation as the pen and paper, telegraph, telephone, computer and mobile phones, although based on an information theory of aural signs (drum sounds - or tones – patterns and sequences) versus visual signs (letters, numbers, operators). The different kinds of meaning children produced required them to use different modes of representation (oral, visual and rhythmic). For example, in the UGP workshop, children mainly *listened* and *spoke* about their feelings during circle assembly time, practiced *reading and writing* letters using *Alphariddims* notation in child-parent dyads and *drummed* out names and words using different means, such as their bodies. In my view, the notion of a *sequence* is the basic conceptual object common to these different modes (speech, writing, music and dance), which could serve as a starting point for the multimodal application of a visual symbol system to teach literacy. Further research is needed to validate this. Nonetheless, UGP required children to practice multiple modes of literacy, not solely reading and writing. This multimodality emphasis of the study is not to invalidate the importance of standard definitions of literacy but rather to investigate how competencies in one mode can be leveraged to motivate the development of skills in other modes, as the evidence from the workshop demonstrates. Like in other learning situations, children were able to participate in social activities in which they were emotionally invested while engaging with the symbols, practices and conventions of a community of practice in order to develop embodied skills.

Recommendations

The insights from the study can be summarized into the following recommendations for early childhood literacy practitioners regarding the cultural systems and tools, embodied learning spaces and practices, community participation structures, and technology infrastructure needed:

- Integrate cultural knowledge and systems
- Connect children to multimodal intelligences
- Provide active learning experiences that engage multiple senses simultaneously
- Bring together diverse community assets and adult mentors to guide, inspire and make connections to broader communities

- Create sustainable partnerships to disseminate the UGP approach to early literacy
- Integrate telemetric and archival tools for assessing and documenting multimodal experiences over time
- Collaborate with families, leaders and technologists across areas of expertise to inform designs and plan cycles of reformulation
- Invite research and industry partners and incorporate them in the iterative process

These recommendations will be further elaborated in the conclusion chapter, in the context of implications of the research for early childhood practitioners, researchers & teacher educators, parents, out-of-school professionals, educational technology designers and policymakers.

Chapter Eight – Conclusion

The research has demonstrated the *Drumball-Alphariddims* embodied learning system as a promising methodology for early childhood education consistent with a multimodality framework, as a complement to conventional early literacy practice. The research also demonstrated that embodied knowledge children already possess can be used to scaffold literacy practices across various contexts. This study aimed to investigate effective pedagogical strategies for embodied multimodal literacy learning through the design of culturally-grounded communication tools and systems. The *Drumball-Alphariddims* and UrbanGriot.org system prototypes were introduced as the instruments for the research, along with a 4-week early literacy curriculum centered on voice, rhythm and movement. Based on a qualitative analysis of the intervention findings in connection to the research questions, it can be concluded that children's embodied knowledge and sociocultural heritage are powerful foundations to build upon when designing and facilitating family literacy practices. The findings indicate that young learners explored early literacy behaviors, social dispositions and emotional understandings from rhythm-mediated instruction that stimulates their vocal, rhythmic and kinesthetic senses in group-based meaning-making activities. By leveraging a culturally-grounded embodied learning approach (at-home, out-of-school or online), parents can evaluate children's alphabetic knowledge by engaging children's interests (like drumming, singing or dancing) and leveraging their tacit/embodied knowledge to bring their full range of literacy behaviors and multiple intelligences to bear in the work of literacy acquisition and socio-emotional development.

The UGP model builds on the current trends of children's at-home and out-of-school practices such as music and movement, singing or playing video games and mobile apps to introduce new literacy practice experiences. Most focal children and parents in this study had no prior experience with drumming or African culture in general, nor did the parents fully embrace the dimension of the research concerning children's use of digital tools, which brought about certain limitations. Therefore, the larger aims of the study were not fully achieved in terms of documenting visible impacts of the UGP hybrid approach to multimodal experiences on children's literacy development, particularly in the areas of aural/visual literacy skills related to letter naming and word spelling. Still, the study showed positive outcomes in terms of the impact of the workshop on children's social participation, emotional development and family relations, especially for those children the parents were the most concerned for in terms of their level of development compared to their peers. The technocultural framework involved in UGP builds on the cultural system of talking drums and keeps pace with the latest developments in new media technologies (HCI, AI, AR) to create informal meaning-making contexts, offering children and parents ways to approach communication in different modalities, including body rhythms, drumming and *digital drum talk*.

Summary

In Chapter One, I situated my study in the Afro-futuristic context of the film *Black Panther*, a fictional superhero from the Marvel Comics universe of characters. I highlighted discursive ways in which the talking drum was used to announce T'Challa's appearances on-screen via repetitive drum calls to be understood as aural signs standing in for his actual name. I drew a parallel between T'Challa's responsibility as protector of Wakanda against a multitude of threats to the challenges parents, educators and school leaders face in trying to provide access to learning opportunities that will prepare all children for entry and success in the 21st century

education system and society. I claimed that culturally-grounded embodied learning approaches to early literacy that leverage the multimodal affordances of the talking drum as a cultural practice and communication system is a viable focus of research in early childhood education which can open up new avenues and possibilities for improving children's embodied knowledge and socio-emotional outcomes. I explained how cultural historical activity theory allied with speech act theory provides a helpful lens to understand how people interact in learning environments through the use of language as a tool, and how activity theory helps to understand how technologies are designed and used to mediate between people and the environment in the context of learning situations. From this perspective, I cast drum language as a multimodal pedagogy integrating voice, rhythm and movement modalities that supports the desired object-outcome of the Early Childhood Education activity system. I introduced the *Drumball-Alphariddims* design as an example of drum-language-based digital media intended to stimulate multimodal literacies while also providing opportunities for socio-emotional development, and presented my research questions guiding this study into the impacts of its application.

Given the wide range of areas relevant to a study of drum language practices and principles as scaffolds for early literacy learning in a digital context, Chapter Two outlined the theoretical framework setting the rationale on how the various research areas are related and can be built upon. Drawing from the literature on talking drums in cultural anthropology and literacy studies that defines drum language as a communication mode, I used multimodality theory to think about how we can extend the *speech surrogacy* function of drum language through the design of new embodied literacy practices as well as digital media (in which, as we know, all modes can be converged unto a single platform). The term *digital drum talk* was defined to point to this digitally-mediated application of the drum language mode to engage in literacy practices across semiotic domains (oral speech, visual/written text and embodied rhythm-as-text). A CHAT-informed design-based research framework helped to articulate the structure and components of the UGP early multimodal literacy activity system and theorize on the potential impacts of designing rhythm-mediated embodied learning tools that can transduce and use *rhythm-as-text*. I proposed the theory of *digital orality* to explain how the forms, functions and applications of such integrative cultural systems can introduce new modes of human-computer interaction that have the potential to enhance teaching and learning.

Chapter Three further explained the design-based methodological approach, discussing the research design of the study in terms of the activities and technologies to be designed and tested. The conjecture map gave the theoretical logic articulating the expected outcomes of the intervention in light of the mediating processes and embodiments of the tools/materials, activity structures and discursive practices of the workshop. I also provided details about the site, participants and apparatus of the study, as well as the qualitative methods of data collection and data analysis through the four phases of the study.

Chapter Four recounted the formative research process surrounding the design of the intervention, starting with the theoretical and conceptual spaces out of which the project was ideated, (i.e. at the intersection of technologies for creativity and learning with the issues of literacy surrounding urban education), resulting in the *Drumball-Alphariddims* concept of a multimodal embodied learning environment grounded in the practice of drum language, as an example of how educators can approach the design and application of technologies for literacy learning from the perspective of on a non-Western cultural system of knowledge and communication. I traced the formative stages involved in the collaborative design process of the apparatus through two different programming environments (Processing and Unity), including

the trials runs at applying these ideas and tools in real-life contexts through a series of community-based media salons and mock sessions.

In Chapter Five, I presented the final design of the tools, materials and processes that went into the intervention and answered my first two research questions on the impacts of culturally-grounded, multimodal embodied learning ecologies on children's early literacy and socio-emotional experiences. My findings suggested children can explore literacy behaviors when engaging with the *Alphariddims* multimodal symbol system when embodied through simple sound gestures to produce sequences representing spoken or textual meaning, however the drum-mediated use of *Alphariddims* seemed to introduce too many levels of indirection, and was thus a bit too advanced for this cohort. Additionally, by virtue of its circular and dynamic activity structure, the workshop encouraged (or reinforced) new (and existing) social participation dispositions, and fostered greater emotional understanding and expression of social identity in children. These findings are significant as they relate to the modes of literacy practice, the kinds of learning environments and technology supports homeschooling parents (and classroom teachers) need to consider in thinking about how to best prepare children for the work of literacy acquisition in ways that positively stimulate their socio-emotional development, rather than frustrating it, especially for those children who do not seem to benefit from or connect to conventional approaches.

Chapter Six answered my third research questions on the impact of the UGP approach on children's family relations, as reported by parents in the survey, interview and focus group. These findings suggested parents' gained new tools for evaluating children's alphabetic knowledge, while playing an enabling/mediating role in children's multimodal experiences in the environment, even though it was also found that some parents' role had an inhibiting impact on some aspects of children's learning (like them using digital tools). Overall, all parents agreed that the cultural aspects of the UGP framework offered expansive possibilities of literacy and social activity for children of this age group, and perhaps more so for even older children, as two parents said the material was a bit too advanced for the children in this focal cohort, especially the younger ones. I concluded by exploring some implications of these findings for both parents and designers, in terms of influencing parenting decisions around what they can do to recognize and encourage the development of their child's multiple abilities and aptitudes.

Chapter Seven discussed the study results from a CHAT perspective, interpreting the findings in terms of the interaction of children with tools in community organized according to particular roles in pursuit of the object-outcome of supporting children's multimodal literacy and socio-emotional development, and using the conjecture map to explicate the *digital orality instructional theory* at the core of the intervention. This interpretation focused on three main components of the activity system (tools, community and division of labor) and involved the observation of sociocultural activity on three planes (communal, interpersonal and personal). Finally, I highlighted some of the limitations of the study, and made some additional remarks on the implications of the research for atypical populations.

Towards a Culturally-Diverse Pedagogy of Play

Early childhood scholars struggle to conceptualize, document and investigate the relations between play, learning and development in contemporary sociocultural environments, making this an international problem. What has emerged in northern hemisphere continents is that early childhood settings are increasingly becoming more academic (Husa and Kinoshita 2005:55). As the pressure on teachers for raising academic standards increases (Hedges and

Cooper 2014), we see a narrowing view of what is play in the policy arena, where intellectual and imaginative dimensions of play are being considered in new ways, with the cognitive and learning benefits associated with play as typical justification. Furthermore, observed play practices and the derivative theories have tended to be based on only some cultural groups, and the subsequent models of play have become the universal view of how children play and how their play develops (Goncu and Gaskins 2007).

But play is a cultural expression whose conception is based on the activities and daily lives of children, so different cultures offer new models on the purposes of play. From the Vygotskian perspective, which has inspired many early childhood scholars since the 1960s, the conception of play as the “leading activity” in the development of young children provides powerful new directions for thinking about the impacts of play in various cultural communities. “This approach is important as it brings to our attention the cultural contexts and content of play and challenges Western perspectives” (Fleer, 2018:59). For instance, children’s games in traditional African culture can be analyzed as initiatory exercises with epistemological (related to apprenticeship into systems of knowledge), diacritical (related to the games’ sociocultural origins) and imitating (by which games gestualise institution) functions (Mbonji, 1992:1), thereby providing means to preserve and transmit important cultural concepts, values and practices.

Some have pushed against the policy imperatives to narrow the view of play as being only associated with cognitive development (Husa and Kinos 2005) and have suggested that we need to move beyond the binary between play and learning and consider the socially valued developmental and educational goals of play as being mutually constitutive sociocultural practices (Wood and Hall 2011). How do early childhood scholars and practitioners design new culturally-diverse play environments for future learners, especially in “contexts where cultural-diversity exists not only within the preschool population, but also through new arrivals from countries where family values and goals for play based or academic programs may be different” (Fleer, 2018:55, Adams 2015, Parmar et al. 2004)? What does pedagogy look and feel like? I believe that this dissertation and the work of UGP (broadly speaking) can contribute a specific approach to consistently design powerful play-based learning and digital play environments within early childhood settings. Inspired by the work of the Principal Leadership Institute (PLI) in creating a framework and signature pedagogy for integrating performative modalities as a strategy for teaching future leaders, I offered in Appendix J the UGP Early Literacy Intervention Ecosystem Framework as a synthesis of the UGP approach. I believe that this signature pedagogy of UGP is an example of how educators and education technology designers can design culturally-grounded embodied learning experiences that provide developmental benefits for young children by connecting the motive for playing the drum to the motive for acquiring key multimodal literacy skills, across face-to-face and digital contexts. Ultimately, the UGP signature early literacy pedagogy extends the cultural-historical theoretical view of development as a “drama” by using elements of improvisation, role-play and creativity, in combination with multimodality and community and cultural practices, to create a new and different type of early literacy experience that involves personal, interpersonal as well as communal planes of development. As the UGP is an out-of-school program within a design research agenda on the innovation of trans-African cultural tools and practices, voice, rhythm and movement are foundational and vital modalities that must also be utilized. The UGP domains of play (further described in the appendix) help to articulate the signature pedagogy. By facilitating rhythm-

mediated embodied learning and digital play experiences, UGP provides a social context and technocultural framework for early learners to acquire critical literacy skills in various modes.

Implications for Early Childhood Practitioners, Researchers & Teacher Educators

Integrate Cultural Knowledge, Systems and Embodied Learning Practices

My whole intent with this research has been to tie the intangible cultural heritage of drum communication (as a sociocultural activity), in support of the work of early childhood education, in particular tied to the practices that foster literacy and socio-emotional development. In other words, what if the educational community (parents, teachers, researchers) can integrate the verbo-rhythmic and kinesthetic aspects of drum culture and connect these with the goals of early literacy learning (i.e. symbol systems, alphabet, encoding/decoding meaning, vocabulary).

This design-based research study presents several opportunities for the educational community. First, early childhood practitioners benefit from new pedagogical strategies that create avenues for the integration of culturally-grounded technology and practices that can facilitate the inclusion of children's tacit knowledge and existing abilities with voice, rhythm and movement. Second, children apprentice in literacy practices that provide new contexts for interactive play, active learning and meaning-making, as well as benefit from tools and practices that elicit and enable their embodied expression.

Early childhood professionals have long recognized the importance of language and literacy in preparing children to succeed in school. Heidlage et al. (2020) found that "early communication interventions involving parents also are important because language abilities during the preschool years are foremost predictors of children's performance across developmental domains and over time" (2), thus highlighting the deep connection that exists between socio-emotional development and literacy in children's early school success. However, there are still few studies addressing parent-implemented communication and language interventions including infants and young children from low-SES backgrounds. In more recent years, intervention research to prevent achievement gaps as children enter school has begun to focus: 1) on the period of development between birth to 3 years (as this represents a unique time during which transactional effects can have a substantial positive or negative impact on child outcomes) and 2) on building the capacity of parents and early educators to provide literacy activities with the children at home or in the community (Walker D. and Carta, J., 2019). Some studies have examined innovations in the implementation of reading interventions that build upon the literature associating oral language experience and later vocabulary (Burchinal et al., 2000; Dickinson, Golinkoff, & Hirsh-Pasek, 2010; Walker et al., 1994), while others, like Troseth et al. (2020) for example, report the use of an electronic enhancement to promote parents' use of dialogic reading strategies during a shared reading intervention implemented with parent-child dyads.

The UGP study also relates to other work that is being done in myriad fields of educational research regarding how to develop new resources for parents to interact with children in a homeschooling or out-of-school context, especially in these times of COVID 19, where everyone is looking for answers and solutions to the constraints exacerbated by the new social reality. Angela Chang (a member of our Design Advisory Circle) who wrote her dissertation on TinkRBooks is one such researcher who contributed key insights on how haptic/vocal interactivity with story elements can support parent-child storytelling. Questions she and others like myself are asking ourselves are: *What are some ways that parents can take more leadership in their children's early literacy and socio-emotional development in order for them*

to gain the necessary foundational skills? What are some approaches and ways that parents and teachers can agree for grounding their interactions with children in an educational context? What are some assessments that we can do to make sure that children are meeting the requirements for learning? Innovative approaches are needed, especially those that can leverage children's tacit knowledge and ability of using voice, rhythm and movement towards the development of new multimodal literacy and social participation skills.

Beyond the homeschooling context of the present study, the findings have implications for teaching and the preparation of teachers and future school leaders who are responsible for framing the kinds of experiences children will get to have within a school-based setting starting from Pre-K. Ideally, teachers would have insight into their students' daily experiences and of the cultural practices and systems valued in the communities to which they belong, in order to develop curriculum in a way that embraces their embodied and communicative capacities (which themselves are shaped by the cultural tools and communication systems communities have historically used to preserve tradition and inculcate knowledge – like the drum). Professional development also requires intentionally designed learning sequences that promote teachers' understanding of the critical issues of literacy within today's and tomorrow's digital and multimodal contexts. Here I draw from the work of the Principal Leadership Institute and its framework "laying the foundation for integrating performative modalities in social justice leadership preparation as a strategy for teaching future leaders how to understand and address the conditions necessary for truly transformative teaching and learning in schools" (Cheung, R. and Tchetgen, P, 2020:5). This raises the issue of how to best develop teachers' digital competencies around technology tools and digital learning, now that distance learning has imposed technology as the primary context for teaching praxis.

Implications for Out-Of-School Professionals

Bring together diverse community assets and adult mentors to guide, inspire and make connections to broader communities.

In the case of the UGP, before securing PACC as the study site, several unsuccessful attempts were first made in other venues in the Bay Area (dance center, day care, preschool) to test the viability of conducting a study in a way that would allow the involvement of the wider community. In the end, PACC was selected in part due to its organic participatory culture as a well-known literary and performing arts center where organic community connections are a regular occurrence. At the core of the recruitment effort to introduce the workshop was the Open House event a couple of months prior which allowed me to build a relationship of trust with the center staff as well as involve members of my own community, who were recruited based on their cultural knowledge and professional experience as dancers and drummers. From the Open House, children, parents and general attendees had a chance to try some of the modalities that would be offered in the family workshop (which was announced and advertised through hand flyers), and out of this experience came the connection with one of the parents that would later introduce me to the homeschooling community that participated in the UGP study.

These parents came to the UGP with connections to authentic communities of art practice. For example, Solibren has been making zines and selling them online or at zine fests for more than 7 years, Olivest and her husband play Taiko drums and used to be part of a performing group in Mt Shasta, Malabri's sister is a folkloric dancer who regularly involves Machi in her dance practice. These parents were able and encouraged to use these relationships to bring in

outside artists and educators at PACC, thereby broadening the children's exposure to multi-cultural, multi-modal perspectives and experiences, in general. Out-of-school early childhood education activities (like UGP) that leverage existing community assets (like renting cultural arts center to host workshop series, or recruit performing arts practitioners to present their craft and teach) create pathways for other actors in the wider system to do the same and get involved in the creation of similar apprenticeships for our youngest learners.

Create sustainable partnerships to disseminate the UGP approach to early literacy

By virtue of its object and desired outcome to reinforce children's existing embodied knowledge and tacit skills in order to improve their multimodal literacy and socio-emotional competencies, the UGP activity system is part of a network of activity systems which includes all other early childhood education work and initiatives spearheaded by agencies at the local, state and national levels. As such, efforts were made before, during and after the 4-week workshop intervention to establish communication and seed collaborations with other organizations committed to improving the lives and futures of children and families (summer camps, churches, after-school programs, local public libraries, community colleges/universities and state agencies). Collaborative one-off programs that spanned multiple sites and incorporated various strategies and tools from the workshop made it possible to share the UGP experience and vision and receive valuable feedback on its promise from a broader audience of potential long-term partners/sponsors. These community outreach programs took the shape of open house/live music performance events for story time at the library (Dunsmuir, Eureka, Ashland), music classes during summer camps and festivals (College of Siskiyous, Mystic Rising), or public presentations/talks on college campuses (Humboldt State). This interest from the general public beyond academic audiences indicates that parents see value in out-of-school spaces (like the UGP) that complement the learning conventional schooling seldom provides, which is an encouraging sign for refining and scaling the workshops and research in the future.

However, due to the closure of schools and centers resulting from the Covid-19 pandemic, face-to-face workshops are no longer an option. Instead, UGP has been planning a series of free online workshops aimed at supporting parents in developing virtual early childhood activities, homeschooling curriculum, and virtual play-based learning experiences for children. The focus of these webinars is on helping parents develop repertoires of voice, rhythm and movement practices and games as well as gain access to online learning resources. The goal is to help parents cultivate leadership capacities in their child's early literacy acquisition and socio-emotional development at this challenging moment in history by providing virtual spaces for them to become aware of possible approaches to support children's learning by exploring the UGP workshop's curriculum, online tools, resources and games.

Beyond the research focus of this dissertation study on literacy skills (like alphabetic knowledge, vocabulary and word spelling), there's something about the family dynamics that arose in the context of the workshops that is very appropriate to this modern time when the educational system doesn't really address that at all. *How can we bring in children's embodied skills and knowledge, including parents' expression into the context of homeschooling and out-of-school contexts so that children feel comfortable expressing who they are and seeing their own needs met by the educational system?* The impact of the challenges moving forward will depend on how the educational community responds to the pressing need of strengthening partnership ties within and across system actors, as well as building solid technology infrastructures (with the help of industry partners), in order to increase the field's capacity to

reach and support more children and families in achieving successful outcomes on these critical literacy and socio-emotional learning milestones. It will be necessary to develop new means and spaces to engage families to reflect and share strategies for supporting children's learning (especially for those without expertise in early literacy and language learning), as well as innovate on how to address the concerns about possible negative outcomes of computer use and digital screen time. The UGP's hybrid approach seems viable.

Implications for Educational Technology Designers

Integrate telemetric and archival tools for assessing and documenting multimodal experiences over time and across spaces

This study comes at a time when the discussion of the role of computational technology in children's development has become increasingly polarized. On the one hand, we find an increased push from the EdTech sector that leverages new technologies in order to further disrupt and transform a model of education which has left many on the margins, while on the other hand, a push-back from concerned parents, educators and researchers across the board places policy restrictions on children's access to computer technology and the Internet. The *Urban Griots Playground* model is informed by the perspective of educational technology researchers, like Cassell (2001) who find the answer in responsible and developmentally informed design and evaluation of technology that specifically targets the needs and unique abilities of young children.

Providing access to digital tools and online resources does not guarantee that parents will be on board to use them or agree on their pedagogical value (as the UGP study is evidence of), yet data records documenting information about children's various multimodal literacy and socio-emotional competencies can be important resources to communicate individual progress, identify children who might need additional support and plan timely intervention strategies, whether these strategies themselves involve digitally-mediated practices or not. In the UGP, children and parents' dyad profiles were not always completed for a variety of common challenges parents of young children face regarding data organization and time management. Profiles (in their intended use) provide a window into UGP parents and children's evolving experiences and practices improvising with the tools and celebrating incremental achievements with the wider community through a social networking platform. To minimize reliance on parents' to monitor children's learning in the context of engaging with the *UrbanGriot.org* online platform and *Alphariddims* mobile app, a telemetric layer is integrated on the back-end to capture all of the activity data of system users. This is basically a database file storing individual players' activity (# play duration, mouse clicks, keyboard/drumpad strokes, # correct letters, # errors, # attempts etc.) through the virtual context of games, modules and digital corpus. These data log files thus provide a complete documentation of children's oral, written and rhythmic productions on various tasks and levels (alphabet, words), critical achievements (leaderboard rankings) and boss level tasks (original compositions). Educators and parents have a vested interest in maintaining a dynamic record of literacy development, as children can demonstrate exponential growth, given the right conditions. Well-documented assessments of children's development and experiences are invaluable to both families and the program, and as new informal, out-of-school and virtual learning spaces emerge, keeping track of children's developing multimodal literacies is key.

Collaborate with families, leaders and technologists across areas of expertise to inform designs and plan cycles of reformulation

Participatory educational technology design research efforts like the UGP study span multiple contexts and organizations, and must therefore incorporate various design strategies that make iterative adaptations and revisions possible, in response to reflections and feedback from the broader community. The *Drumball-Alphariddims* system was implemented on top of early prototypes borne out of coursework at UC Berkeley (*Tangible User Interfaces* at the School of Information, 2011 and *Urban Education* at the School of Education, 2012), allowing me to iterate on the concept by introducing new learning opportunities, features and capabilities based on 1) recommendations from the design advisory circle of experts recruited across various disciplines, as well as 2) my own observations from testing the use of the system with different sets of parents and children throughout the formative research period. These insights from users and researchers were instrumental in giving concrete direction to the implementation effort in terms of what would be useful. The opportunities and settings for collaboration that contributed the most regarding such constructive feedback on the apparatus include the Trope Tank (Nick Montfort, Angela Chang) & Ice Lab (Fox Harrel) at MIT/SHASS where I spent a year (2017/18) on a Dean's Predoctoral Fellowship exploring interactive fiction and digital poetry concepts and programming techniques (like rhythm and text generation) which are part of the user *Drumball-Alphariddims* user experience, as well as the ACM Creativity & Cognition conference Graduate Symposium (2017) and Demo Session (2019) where I received valuable input from fellow graduate students, faculty and researchers from across the field of HCI. I do not wish to imply that these institutional connections must exist before an intervention or tool is designed or introduced, but the benefits they provide in terms of access to potential intellectual, material and financial resources that can further improve the work, are important factors to consider.

Invite research and industry partners and incorporate them in the iterative process

The design advisory circle was and will continue to be an integral part of the UGP's infrastructure. Drawn from universities, companies and organizations around the world, the design team members consist of faculty, graduate students and professionals in the fields of African literature, literacy, music, linguistics, educational technology, comparative media studies and human-computer interaction. As described in Chapter 4, the scope of their involvement span a broad range of design concerns, including the integration of cultural values and elements, user interface design considerations, theoretical and practical aspects of the learning experience, content resources and gamification methodology. During the design process, advisors often posed probing questions that upon investigation led to the reformulation of the tool/interface design or introduced new features.

Essentially, the design advisory circle played two roles. In one capacity, they provided peripheral perspectives when testing and critiquing the tools and curriculum as they were being developed, pointing out weaknesses and making recommendations for improvement. On the other hand, as insiders, they became connectors and enablers of the research, providing connections with additional artistic, industry and professional communities, thereby contributing new ideas and resources. All these approaches are attributes of what has been called a "learning organization" (Senge, 1990), and studies of organizations in domains as diverse as business and scientific labs suggest that connecting with diverse communities, establishing practices for recognizing good work or progress, and fostering collaborative interactions are associated with innovation (George 2007; McLaughlin and Talbert 2001; Barron, 2014).

Implications for Policymakers

Connect Children to Multimodal Intelligences

By investigating drum language as a learning mode and design focus, I am arguing not only for a culturally-grounded pedagogical approach to literacy learning, but also proposing policy changes in instructional practice and technology innovation aimed at shifting the ways schools engage with different cultural systems in the process of socialization in such ways that could open up new pathways of learning, healing and social transformation for all children, especially those at-risk.

The potential of the *Alphariddims* visual symbol system to mediate between different modes of communication (textual, verbal, rhythmic and embodied) is at the core of the choice of this conceptual tool as the integrative cultural concept grounding the learning experiences and practices in the workshop, since talking drums in their mechanics employ sounds of different pitch (commonly represented as visual symbols in notation systems) to mimic different parts of speech. Being exposed to *Alphariddims* gave children a context to practice producing rhythms with their bodies and via improvised surfaces (musical intelligence), moving their body (kinesthetic intelligence), as well as connecting with others in playful exchanges (social intelligence). More design work is needed on the tangible multimodal interface to see if this approach also provides children with an effective context to explore alphabet letters, word forms and spellings.

While schooling is still mostly organized by outdated tools and space-time relationships, new digital tools bring many opportunities to advance the agentive participation of all youth in formal as well as informal educational spaces, regardless of their cultural, social or linguistic background (Hull, Stornaiuolo 2010). Multiple, and technological, literacies have become the topic of considerable research in Applied Developmental Psychology. Recent research highlights the importance of new technologies that both magnify and simplify access to and creation of multimodal texts (Mahiri). The *UGP* technocultural framework was designed to facilitate parents and teachers in bringing a different kind of STEAM learning into existence in homes and classrooms that is consistent with other cultural ways of learning and communication systems that we know from the literature have powerful sociocultural implications and applications. Particularly tangible non-screen-and-keyboard-based computational technologies are being actively researched to better understand the unique role they can play in supporting emergent writing literacy activities (Cassell, 2004), by leveraging one specific ability of young children – the ability to tell stories in order to address their specific need of learning how to write; seeing here writing as the ability to *make meaning* for others across space and time.

Implications for the Future of African Education

Throughout this dissertation, my research has focused on the potential of trans-African cultural practices and systems (drummologie, in particular) on the literacy and socioemotional achievement of children. This direction of the research was reinforced by the research in African American Psychology, like Belgrave and Allison, (2006) who wrote that “African American children can perform at levels comparable to other academically successful ethnic groups when they are taught under culturally congruent conditions” (285), or Cole and Boykin (2008) who found that “learning among African American children is enhanced under conditions of rhythm and verve” (252). As the *UGP* study findings implies, the integration of drumming and drum

language in early language instruction using technology that is culturally-grounded in its design and interaction framework can facilitate the inclusion of relevant cultural knowledge and history in schools to provide new gains for children in literacy processes and other skills as they learn how to decode rhythm as text (reading) and how to move their bodies rhythmically in order to produce meaning (writing) across a variety of subjects and contexts.

In today's digital age, drums have been all but entirely replaced by information and communication devices (phones, computers) as the instrument for transmission of verbal messages across vast distances. Ong (1977) noted the fact that “the movement from orality in the West to the modern technological world took some 6,000 years” and that “the transit from orality through writing and print to electronic communication in Africa is taking place, not over 6,000 years, in two or three generations, and for many even less time” (428) raises several important issues. While new forms of communication media (like radio and TV) have played an important part in the preservation and dissemination of cultural and historical knowledge of Africa, they have done so at the cost of a break with the past, due to the fact that these forms of media technology have mainly come in a form of communication based on print and generally in a foreign language (like English or French). As a result of this, indigenous traditional forms of knowledge – like drum language – that played a central role in maintaining the social and political organization of the territory, ensured cultural transmission and reinforced values and norms of behavior, have been disrupted. The fact is that there aren't too many people left today, even in West Africa, who possess deep knowledge of drum language, which used to be a part of the pre-colonial method of communication and socialization. Thus, exposing the meaning of drum language texts in a digital orality system that is online, searchable and expandable is an innovation with far-reaching implications, not just for the educational research community here in the United States, but also for the global preservation, exchange and dissemination of intangible African cultural heritage and knowledge.

Archival preservation via technological means, by its design and process of data isolation, documentation and storage in international, regional, national or university archives are typically a poor match where Indigenous knowledge (of which drum language tradition is a type) is concerned. According to Oppenheer (2009), “ICTs are being put to many different uses for cultural preservation – from the creation of databases and archives to organize and keep safe important understandings and artifacts to the development of iPhone apps for language learning” (2). However, in the developing world, this work often times suffers from several challenges and epistemological conflicts resulting from the clash between the “Western values embedded within ICTs and the cultural communicative preferences of Indigenous people” (2). Hence, this dissertation may have been most original in bringing attention to the potential of drum language as an early literacy scaffold in the context of digital orality hypermedia systems. By researching drum language as a viable participation framework for early literacy learning, and by investigating the potential of *drum talk* as a method of communication within culturally-grounded learning environments, I am arguing for an embodied approach to early childhood education, based on the evidence from this literature which points to the cultural system of drum language, not as a culturally-relevant *concept* to teach, but rather as:

- 1) a context for teaching and learning both in-school and out-of-school, as well as,
- 2) an instructional paradigm for parents and teachers to design embodied play-based environments to facilitate literacy learning and,
- 3) a design context for educators, artists and computer scientists to build upon

I believe that research on culturally-grounded embodied learning ecologies like the *Drumball-AlphaRiddims* system, can help to demystify some of the prevalent misconceptions about African culture, and furthermore spur more scientific interest in the pedagogical and technological potentialities of its cultural systems of knowledge beyond the aforementioned benefits it provides:

- * builds on tacit knowledge children already possess (voice, rhythm & movement) towards the acquisition of new literacy and socio-emotional competencies (reading, writing, digital skills, symbolic understanding, emotional understanding, social participation dispositions)
- * integrates the cultural framework of drumming, with its dynamic forms of social participation and multiple learning modalities (like orality, dance, drum language or polyphony), to stimulate children's multimodal literacy behaviors
- * introduces strategies that parents can use as part of their repertoire of literacy practices with children at-home or out-of-school (call-and-response, gestures, rhythm-to-text transduction)

Concluding Thoughts

I began this dissertation with a vignette from the movie *Black Panther* which spoke deeply to so many since it first came out, due to its positive representation of African culture. I end this dissertation as Chadwick Boseman, the actor playing the main character T'Challa in the film, just passed away. Beyond the impact that the death of this young talented actor who grew into an international hero is sure to have on a generation of young children who grew up in the imaginary universe of *Black Panther*, this tragic loss is happening at a time in real life when this country is in a severely divided state, in the wake of the killing of George Floyd which sparked anti-racism protests around the world. The time is urgent for addressing the racial injustices and discrimination that have become normalized within our institutions, including our institutions of learning, and the educational community is at a critical junction. In the words of Dean Prudence Carter in a message to the Graduate School of Education community on August 25th, *the conditions of our times present us with an opportunity to critically reimagine the functions of education and schooling — how we do it and for what purposes we utilize and engage in it.*

Now is the chance for parents, educators, researchers, policymakers, technology designers and all other stakeholders in the early educational experiences of children to reimagine schooling in ways that get at the cultural and moral values that are so needed in our times, focusing not just on standardized outcomes, but cultivating the human, social, emotional, ethical and cultural dimension of development as well. With the damage that has been done to the image of Africa and Africans throughout history, and especially in this country (one of the most “developed” countries in the world), the US educational community owes it to the present and future generations to create transformational learning experiences that can *plant the seeds* for the kinds of deep emotional and cultural understanding we wish to see reflected in society, starting from the very early stages of life.

To me, any family should be able to support every child that is brought into this world in securing the foundational skills he or she will need to effectively communicate and participate in society from the early stages of life. However, our conventional praxis of schooling (with its standardized testing practices and strict expectations of what a child should be able to do and by

what age) often takes more the shape of a competitive race than a cooperative work to help all children achieve. But, as the proverb goes, *it takes a village to raise a child* (so families can't do it alone), and achievement is beyond competition (so individual success alone is not enough). True achievement requires preparation on a myriad of fronts, including literacy competencies to navigate various systems of communication, interpersonal skills to negotiate multiple contexts of social interaction and emotional security to be confident in one's own abilities. As Nader Kahlili says, "the human capacity is much higher than what we see in the races and competitions and that can only come when we are after our quest" (Kahlili, 1983). If we can integrate the tacit knowledge children possess and yearn to demonstrate (running around, singing, jumping, dancing, producing sounds, telling stories etc.) with the literacy and socio-emotional needs of children in the context of daily parenting routines and interaction, then we are making an impact, as each family can have the tools to equip child(ren) with the behaviors and understandings they will need to thrive on this lifelong journey of learning.

For myself, answering this call will involve future cycles of design and intervention focused around the robustness of the *Drumball* tangible device on one hand, and the development of a progressive web application as this approach will help simplify technical problems related to the dissemination and cross-browser compatibility of the platform on desktop, laptop or mobile devices. Given the restrictions imposed by COVID-19, future installments of the UGP family workshops are unlikely to occur, so my plan will be to take advantage of the latest technologies to combine the best of web and mobile apps to bring UGP's culturally-grounded rhythm-mediated literacy learning experiences to families around the world. My goal beyond the PhD will be to deepen my practice as an educational technology designer and web architect in an international context collaborating with artists, parents, teachers, faculty/scholars and undergraduate/graduate students across various disciplines (Education, Music, Electrical Engineering, Computer Science, Information Management & Systems, Business, African Studies etc.) to translate the *Drumball* research into a full-fledged learning organization/social enterprise (EdTech Start-Up) that can provide a way for others to invest in international education (for example, broker for various university systems in Europe and Africa).

The cultural dimension of this work has always been very important to me. As my academic career aspirations are to contribute to the educational research community the potential benefits to be gained from the perspective of systems of knowledge production and transmission grounded in non-Western cultural systems, I foresee my future self being a reflection of a balance between 1) my research interests in language, culture and multimodality 2) my passion for the arts and lifelong learning, and 3) my entrepreneurial spirit, by designing alternative learning tools and advocating for ways of teaching that can inspire all children, as well as parents and teachers, to expand their repertoires of knowledge and practice by integrating non-Western cultural systems and practices.

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Appendix A

The Urban Griots Playground program: Workshop plans Session guidelines and objectives

The weekly summaries/instructions for each workshop session is provided below:

SESSION ONE: parents and children will explore the alphabet and spell their names rhythmically

CIRCLE: Think about varied embodied ways of representing one's name. Learn alphasiddims drum codes to sound out the letters/syllables in one's name

E-LEARNING: Think about character representation and cultural identity in creating drum names representing significant people, places and events in one's life

GROUP PRACTICE: Work productively in a collaborative setting to improvise scenes using drama frames (a form of digital media role-play)

SCHEDULE Circle Assembly (5 minutes)

- Go in the circle and have introductions, with names and one-word description about how you are feeling today.

Circle Activity (25 minutes)

- Distribute the alphasiddims kits to the parents (also projected on the wall)
- Inform children that they will be discussing names in general, and drum names in particular
- Show the process by beating out the first letter of your name for the children (e.g., P: tone-slap-tone-slap for Pierre). Families practice with the alpha siddims cards to beat out the letters in their names (children first, then parents).

e-Learning Activity (40 minutes)

I. Character Development: This activity challenges the children to think about character representation and issues of identity, culture, history and race in a broad, non-threatening context

1. Tell the children that they will be creating drum names representing how different events, places and people informed their character.

2. Drum names are short formulaic phrases played on talking drums. Explain to children the function of talking drums in African society. Browse sample drum names from the corpus. Play the rhythms and repeat for children to listen again.

3. Instruct the children to work on the profile they created on www.urbangriot.org.

4. Children may add additional details like the character's location, as time allows.

5. Once the profiles have been completed by everyone, go around the room and ask each child to share three things about their avatar, such as the character's drum name, where they are from and one significant event in their character's history. Allow a few minutes for the children to explore

the Drumball site and to read other character profiles.

Group Practice (25 minutes)

6. Have the group divide up into teams of parent-child pairs.

7. Instruct the pairs to think about a story that involves their respective avatars, how they came to learn about the workshop and what actions/problems they had to engage in order to be here together. Once all pairs have generated a basic outline of a back-story for their avatar, proceed to the next step.

8. Instruct the pairs to search online for three medium-length or shorter drum messages that their avatars exchanged BEFORE they arrived at the workshop. Two places to start looking for images are: audio corpus and proverbs map. The children need to be thoughtful about what brought these avatars together in the first place, and what prompted them to finally go to the Drumball workshop.

* Let the children know they will be adding more pictures and sounds of their characters' adventures AFTER they leave the workshop into the site

* Let the children know that they do not need to complete this story today, that next session they will be returning to finish it, and that they will have access to the site from home to send messages to each other * Have each group post each drum message onto the site's forum page.

Share-Out (15 minutes)

•(Go around the group quickly): Give a one-word description of your story so far. •How did you pick the messages to put your characters in context? Fun, imaginary, serious? •How important is the order of the messages if you want to present them as a performance at the workshop? Will the story still make sense if the first and third message will switch places? What if the messages were sent by different characters? Would it be a more or less compelling story then? •What are the advantages and disadvantages of creating fiction in a group? •What are the advantages and disadvantages of communicating using drum language?

Questions for reflection:

- Does the avatar you've created seem more real to you now? Why or why not?
- How did you decide how to write your drum name? Can you determine meaning from the rhythm?
- How does your avatar name differ from your name? From other avatars?
- How are each of the avatar icons/rhythms different from each other? How might their perceptions differ?

Before everyone leaves for the day:

* Encourage parents to download digital copies of the workshop guide and final performance showcase materials to examine; let them know this is what they'll be building towards in the coming weeks!

DAY TWO: parents and children will create praise poems and personal drum names

CIRCLE: Think deeply about emotions (our own and others') and how these can be represented through sounds, visuals or movement

E-LEARNING: Listen to drum appellations. Think creatively about character representation by creating a praise poem to introduce avatar.

GROUP PRACTICE: Combine rhythm and movement to create an animated dance (character development)

SCHEDULE Circle Assembly (10 minutes)

1.Go in the circle and have children take turns spinning the wheel to indicate how they feel. Record each selected face (happy, excited, worried, angry, sad, tired, calm) and review the basic of each feeling, eliciting stories from children (rainy day, sunny day, blue day etc.). 2.Discuss the emotions from the board (organized by opposite meaning)

Circle Activity (20 minutes)

1.Explain that in certain places, like among the Kele in the Congo, drum communication is used for formalized announcements. There are drum messages about, for instance, births, marriages, deaths, and forthcoming events (e.g., wrestling matches). An example communication is the announcement of a dance with the drum speaking in standardized and repetitive phrases: "All of you, all of you come, come, come, come, let us dance in the evening when the sky has gone down river down to the ground".
2.Go through each emotion, and ask children to illustrate its sound by vocalizing as a group
3.Have the children share different actions they have taken (or have seen others take) in response to different emotions (happy => singing; excited => dancing; sad => crying; tired => laying; calm => sitting). Ask the children what special alert signals could we come up with as a group to express each emotion on the wheel: happy, excited, worried, angry, sad, tired, calm. Perform each action to its corresponding rhythm for each emotion on the wheel.

e-Learning Activity (40 minutes)

1.Have the children reconvene at the central workstation table as last time.
2.Play example praise poems from the audio corpus. Show how to reproduce the individual phrases contained using the Drumball (focal) or regular drums (non-focal).
3.Instruct the children to update the profile for their avatar by composing a praise poem made of 3-5 sentences from the corpus.
4.Children may browse additional proverbs from the corpus by using the web interface.
5.Once the profiles have been completed by everyone, go around the room and ask each child to share their praise poem, first orally, then rhythmically using the Drumball. Parents may work with children to read the sentence while the child performs the drum phrase. Allow a few minutes for the children to share their drum poems with others.

Questions for reflection:

- Does the drum poem convey the type of mood you wanted for your character? Why or why not?
- How would choreographed movements and visuals help get the message across?

Group Practice (25 minutes)

1. Have the families divide up into parent-child pairs.
2. Instruct the children to think about the dance elements for the performance of their praise poem (backdrop, dancer, drummer, action, sequence)
3. Have the families take turns in practicing the dance moves, taking photos doing different steps. Once all the families have generated a basic dance sequence, and taken photos, proceed to the next step.
4. Instruct the groups to upload the photos/videos online so others can practice their dance for next time.

Share-Out (15 minutes)

For next time, they should watch three other dance sequences (in addition to their own), starting with those of the characters in their story group from Day One.

DAY THREE: parents and children will create drum proverbs and explore other forms of drum literature

CIRCLE: Think empathically about emotions and how words and actions can affect these feelings (in self and others)

E-LEARNING: Think creatively about character representation by creating a storyboard to introduce avatar. Outline narrative elements (setting, action, dialogue).

GROUP PRACTICE: Choreograph stage performance combining language, music and movement elements from storyboards

SCHEDULE

Circle Assembly (5 minutes) 1. Go around the circle and ask the children what the group needs today. Call it in through playing the rhythm and performing the dance for each emotion/feeling!

Circle Activity (25 minutes)

1. Introduce proverb song and explain the different parts to children
2. Have children clap along while singing the songs in call and response
3. Discuss the proverbs from the song (organized by counter meaning)
4. Go through each proverb, and ask children to illustrate its meaning by way of a scenario that could happen at home or at school (e.g., sharing toy). Have them explain how the proverb could be used in that context.

e-Learning Activity (45 minutes)

1. Direct the children to the websites: <http://www.storyboardthat.com>.
2. Demonstrate how to insert avatar images onto a single vignette, draw a blank dialogue bubble and paste the text of a proverb copied from the Urban Griot corpus
3. Have children repeat the process and correct any missing/wrong steps

4.Children will then trade off adding proverbs into these slides, making decisions on the ordering of slides, and the assignment of proverbs to different characters in each particular dance scene (5 slides minimum).

5.Allow/encourage children to use digital cameras to take snapshots of team members ‘acting out’ various story elements. Upload and import shots to storyboard file.

Group Practice (45 minutes) In this activity, children will combine the rhythms and dances from their storyboard into a collaborative multimedia drum poetry dance performance involving the whole group. Because each group holds a piece of the final performance, this activity is very interactive and aims to have children experience an audience of collaborators, which is a privileged concept in the new media environment. Children should be encouraged to make connections between stories.

- 1.Have the group gather in a circle
- 2.Invite a group to show off their dance. Mimic the steps.
3. Repeat with each group’s project.

DAY FOUR: parents and children will rehearse and present their drum performances to a public audience

CIRCLE: Think about public audience point- of-view and improvise stage dialogue and interaction

E-LEARNING: Reformulate story by adding improv elements (voice, rhythm, dance) and making connections

GROUP PRACTICE: Practice performing and presenting in front of an audience of collaborators. Drum Language Competition

SCHEDULE Circle Activity (30 minutes)

- 1.Who’s going to see your story? Who would you want to?
- 2.How does your story or the elements in them (location, characters, music) resemble any stories or elements you are familiar with? How are they different?
- 3.How far back in time did you go to tell the story?
- 4.Invite a group to show their story. Allow time for other groups to make suggestions of possible additions/adjustments.
- 5.Repeat with each group’s project

e-Learning Activity (45 minutes)

- What kind of things can improv dialogue add to a story?
- Did you discover anything new about your character or the story by role-playing it? What do you think about role playing as a way to create stories... does it make it easier for you? Harder?
- Did learning drum talk influence what you said in the workshops? At home/school? How you moved on stage?

- How does the setting of the scene(s) in which your character appears inform what could happen, given its location, historical time and place?
- Can you think about the performance from the point of view of the audience? What kind of storylines (real or imaginary) can you envision?

Group Practice (45 minutes)

1. Using the digital camera as the audience, instruct the children to talk to the imaginary audience once they all arrive on stage together. Actors must stay in character, and to remember why they were heading to the workshop in the first place as a frame to guide their improvisational conversations. Drummers remain in place at the Drumball playing rhythms as dancers move about the circle. Videotape the actual performance to upload and share with group at a later time.

Appendix B
Letter of consent from the site

Berkeley Graduate School of Education
UNIVERSITY OF CALIFORNIA
Site Permission Letter

Re: Collaborative Research
From: Pops Performing Arts and Cultural Center, Management

Monday, October 28, 2019

Dear UC Berkeley CPHS Review Board Members,

Based on my review of the proposed research by Pierre Tchetgen and Professor Jabari Mahiri, I give permission for him to conduct the study entitled *Drumball: Improving Early Literacy, Social and Emotional Skills through Children's Digital Drum Talk* within the Pops Cultural Center site located at 5819 Sacramento Ave, Dunsmuir, CA 96025. As part of this study, I authorize the researcher(s) to recruit participants, conduct workshops, collect data and present their research findings at our site. Individuals' participation will be voluntary and at their own discretion.

We understand that our organization's responsibilities include providing a room for workshops (equipped with tables and chairs). We reserve the right to withdraw from the study at any time if our circumstances change.

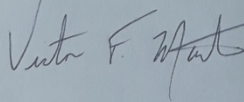
We understand that the research will take place one day/week and include face to face and online activities with one (or more) cohort(s) of no more than twenty children (ages 0 to 6 years old).

This authorization covers the time period of October 28 – November 31.

I confirm that I am authorized to approve research in this setting.

I understand that the data collected will remain entirely confidential and may not be provided to anyone outside of the research team without permission from the UC Berkeley CPHS/OPHS.

Sincerely,



Appendix C

Parental Consent/Permission

UNIVERSITY OF CALIFORNIA AT BERKELEY

BERKELEY • DAVIS • IRVINE • LOS ANGELES • MERCED • RIVERSIDE • SAN DIEGO • SAN FRANCISCO



SANTA BARBARA • SANTA CRUZ

INFORMED CONSENT AND PARENT PERMISSION FOR CHILD TO PARTICIPATE

Drumball: Investigating children's early literacy skills through digital drum talk

Key Information

- ☐ Your child is being invited to participate in a research study. Participation in research is completely voluntary.
- ☐ The purpose of our research is to explore the implications of rhythmic communication technologies as learning tools that provide multimodal feedback that children can manipulate through hand-drumming (letters, words, phrases). The study will take a total of four 60-mins workshop sessions and your child will be asked to compose his/her own drum poetry performance using the *Drumball*.
- ☐ You will be asked to fill out an entry/exit questionnaire about the socioemotional impact
- ☐ There are no direct benefits for participants, and we are conducting this research to determine if there may be some benefit

Introduction and Purpose

My name is Pierre Tchétgen. I am a PhD candidate in the Graduate School of Education at the University of California, Berkeley. I am working with my faculty advisor, Professor Mahiri in Department of Literacy, Language and Culture. We are conducting a research study, which we invite your child to take part in.

The purpose of our study is to understand the implications of rhythmic communication technologies as learning tools for early literacy that provide multimodal feedback that children can manipulate through hand-drumming (letters, words, phrases). We want to gain useful feedback on whether children can learn a digital drum language grammar and what the teaching and learning applications would look like.

Procedures

Pre-workshop

Sign and submit the informed consent/parent permission form.

You will be asked to complete a questionnaire involving a skills inventory of your child's multi-literacies: https://berkeley.qualtrics.com/jfe/form/SV_3rQYJbO7Xso Upt1 (15 minutes - online)

You will be asked to schedule a phone interview to be conducted at any point during the research period. Questions will focus on the early literacy experiences, schooling, interests and abilities of your child. We'll go over more information about the study and I will answer any questions you have about the study. (30 minutes over the phone) – Doodle sign-up link: <https://doodle.com/poll/tw9xczprpp5a8h6>

Workshop

During the first workshop, we will take an initial snapshot of your child's ability to name pictures and recognize alphabet letters as a measure of his/her literacy level before participating in the sessions.

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Your child will be asked to attend **all four sessions**. Topics and activities for each session include the following:

- Letters: playing drum circle games spelling your names on the drums and practicing drumming out the letters of the alphabet using the *alphariddims* cards. You will also be asked to create a profile on the *Urban Griot* platform.
- Names: playing drum circle games tapping out word syllables and composing personal drum names (appellations, 3-5 words phrase) that will serve as a greeting for your child's avatar on the *Urban Griot* platform.
- Stories: creating praise poems that represent important aspects of who you are (family background, culture, history, significant places and people). Combine voice, rhythm and movement to create a group stage play.
- Performance: working collaboratively with others to showcase your stories as a performance.

Post-workshop

At the end of the last workshop, you will be asked to take part in a brief focus group with the other families. This is done in a semi-structured interview format to better understand qualitatively the nature of your and your child's experiences with the workshop (tool, platform, corpus). This share-out is part of the regular workshop time and requires no additional time commitment from you. We will conclude by taking a second snapshot of your child's ability on letter/picture name while you complete the exit questionnaire about the qualitative feeling (10 minutes)

Study time: The estimated time commitment for this study is 5 hours.

Study location: All study procedures will take place at TBD

Benefits: There are no direct benefits to you or your child for participating in this research study.

Risks/Discomforts

- Participating in research always includes some risks. Though we are taking every precaution to keep these risks minimal, there still exists the risk of discomfort due to subject matter and the risk of a breach in confidentiality. Participants are free to decline to answer any questions they don't wish to, or to stop participating at any time.
- Your child might get bored or tired and decide that he or she does not want to complete the study activities. If so, your child can just tell us that he or she wishes to stop.
- *Breach of Confidentiality:* A possible risk for any research is that confidentiality could be compromised, that is, people outside the study might get hold of confidential study information. We will do everything we can to minimize this risk.

Confidentiality

Your study data will be handled as confidentially as possible. If results of this study are published or presented, individual names will not be used.

To minimize the risks to confidentiality, we will encrypt all data before storing it or transmitting it over the Internet. However, we cannot guarantee the complete confidentiality of data transmitted over the Internet.

The *Urban Griot* website has the following data security features to keep your data secure:

- Application security testing to meet Protection Level 1 security standards
- Development and testing environments use de-identified data and full disk encryption
- Secure coding practices: input validation; output encoding; authentication and password management; session management; access control; error handling and logging; data protection; database security;

When the research is completed, I may save the study records for use in future research done by myself or others. I will retain this study information for up to 3 years after the study is over. The same measures described above will be taken to protect confidentiality of this study data.

CPHS # 2018-01-10668

Sensitive/reportable research information:

- We will keep your study data as confidential as possible, with the exception of certain information that we must report for legal or ethical reasons, such as child abuse, elder abuse, or intent to hurt yourself or others.
- If we publish or present results of this study, we will not use individual names or other personally identifiable information. Any audio/video data collected will be cropped or edited to help protect your identity.

Media Records Release

As part of this project we will make audio, and/or video recordings of you while you participate in the research. Please read and sign the attached Media Records Release form indicating how your and your child's recorded data may be used. Some audio/video records from the workshops sessions and activity data logs from your and your child's usage of the platform may need to be retained. We will only keep data that you have signed permission for us to use.

The types of data that may be retained at perpetuity to inform follow-up studies include: your child's first and final performance videos, transcripts of entry/exit interviews and share-out discussions (focus groups), pre-/post-test scores, survey results and any multimodal artifact produced on the platform (e.g. digital drum texts, messages, poems, storyboards).

Compensation/Payment

You/Your child will not be paid for participating in this study

Rights

Participation in research is completely voluntary. You have the right to end your, and/or your child's, participation in this research study at any time without penalty. Nothing bad will happen if you decide to stop participating.

Questions

You and your child may ask questions about this study at any time, now or later. Questions about this research may be addressed to Professor Jabari Mahiri (jmahiri@berkeley.edu), 510-541- 4349, University of California at Berkeley Graduate School of Education, or to Pierre Tchetgen, 415-619-9243 (akwerius@berkeley.edu).

If you have any questions or concerns about your child's rights and treatment as a research participant, you may contact OPHS, the office of UC Berkeley's Committee for the Protection of Human Subjects, at 510-642-7461 or subjects@berkeley.edu.

By signing this form, you are consenting to participate in the study described above AND providing permission for your child to participate as well.

PARENT CONSENT

Please print, sign and return. You will be given a photocopy of this consent form to keep. If you wish to participate in this study, please sign and date below.

_____	_____
Participant's Name (<i>please print</i>)	Date

_____	_____
Participant's Signature	Date

PARENT PERMISSION

If you decide that your child may participate in this study, *please sign and date below*.

*Child Participant Name (*please print*)

_____	_____
Relationship to child	Date

_____	_____
Person Obtaining Consent	

Appendix D Media Release Form

UNIVERSITY OF CALIFORNIA AT BERKELEY

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SAN FRANCISCO • SANTA BARBARA • SANTA CRUZ

Research Media Records Release Form *Drumball: Improving early literacy, social and emotional skills through children's digital drum talk*

As part of this project we will make audio, and/or video recordings of you and your child while you participate in the research. Please indicate below (by initialing) what uses of these records you consent to. This is completely up to you. We will only use the records of you and your child in the way(s) that you agree to. In any use of these records, your names will not be identified.

1. The records of can be studied by the research team for use in the research project.

Audio _____ Video _____
initials initials

2. The records can be shown to subjects in other experiments.

Audio _____ Video _____
initials initials

3. The records can be used for scientific publications.

Audio _____ Video _____
initials initials

4. The records can be shown at meetings of scientists interested in Educational Research

Audio _____ Video _____
initials initials

5. The records can be shown in classrooms to students.

Audio _____ Video _____
initials initials

6. The records can be shown in public presentations to non-scientific groups.

Audio _____ Video _____
initials initials

7. The records can be used on television and radio.

Audio _____ Video _____
initials initials

I have read this form and give my consent/permission for use of the records as indicated above.

Signature _____ Date _____

Appendix E

Assent Script for Children

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SANTA BARBARA • SANTA CRUZ

CHILD ASSENT SCRIPT TO PARTICIPATE IN A RESEARCH STUDY

Urban Griot: Improving early literacy, social and emotional skills through children's digital drum talk

Script

Hi everyone. My name is Pierre and I'll be leading the *Urban Griot* workshop.

Can one of you children tell me why we are here today?

You are here because your mommy or daddy gave permission and agreed to come with you for four Saturdays for us to spend two hours each time playing circle games using different drum instruments, singing with our voice and moving our bodies together. We will also be spending time working together at the table on the computer, imagining and writing stories that you will then perform together on stage with music and dance. At the end of the workshop, all of us will host a final celebration that you can invite your family and friends to. This final performance will be recorded using a video camera. The reason we do this is to increase our ability to speak and listen to others well, as well as communicate confidently our own story on stage through rhythm and movement. Does that sound like something you'll enjoy taking part in?

If there is anything you didn't understand from what I've just said, you should tell me so I can explain it to you better.

If you still want to be in the workshop and play with us, and since your parents said it's okay for you to be in both and agreed to come with you every Saturday, then you can. If you don't want to be in the workshop, it's ok. I won't be upset, and no one at home or school will be upset. You can stop at any time.

Do you have any questions for me now, before we start?

Is there anything else you'd like us to discuss today?

Thank you.

Let's begin!

Appendix F Survey questionnaire



English ▼



Drumball: Investigating Children's Early Literacy Skills through Digital Drum Talk

CHILD ENTRY SKILLS INVENTORY Parent Survey Questionnaire

CPHS Protocol #: 2018-01-10668

Welcome to the Drumball research study!

We are interested in understanding the impact of culture and technology on children's early literacy. You will be presented with information relevant to your child's early literacy, social and emotional development and asked to answer some questions about it. Please be assured that your responses will be kept completely confidential.

The survey questionnaire should take you around 15 minutes to complete, and you will receive an invitation to the Urban Griot family workshop and focused instruction on how to use the Drumball platform to supplement workshop materials. Your participation in this research is voluntary. You have the right to withdraw at any point during the study, for any reason, and without any prejudice. If you would like to contact the Principal Investigator in the study to discuss this research, please e-mail jmahiri@berkeley.edu.

By clicking the button below, you acknowledge that your participation in the study is voluntary, you are 18 years of age, and that you are aware that you may choose to terminate your participation in the study at any time and for any reason.

Please note that this survey will be best displayed on a laptop or desktop computer. Some features may be less compatible for use on a mobile device.

- ☐ I consent, begin the questionnaire
- ☐ I do not consent, I do not wish to participate

What is your child's month and year of birth ?

How do you feel about your child's vocabulary growth at this age?

- ☐ Very good
- ☐ Good
- ☐ Neutral
- ☐ A bit concerned

- ☐ Very worried

How much does your child like to draw or paint?

- ☐ Like a great deal
- ☐ Like a moderate amount
- ☐ Like a little
- ☐ Neither like nor dislike
- ☐ Dislike a little
- ☐ Dislike a moderate amount
- ☐ Dislike a great deal

How much does your child like to sing or play music?

- ☐ Like a great deal
- ☐ Like a moderate amount
- ☐ Like a little
- ☐ Neither like nor dislike
- ☐ Dislike a little
- ☐ Dislike a moderate amount
- ☐ Dislike a great deal

Does your child play an instrument?

☐ Yes (fill in instrument(s))

☐ No

Which artists or what genre of music does your child like to listen or dance to? (fill in)

How much does your child like to play video games?

☐ Like a great deal

☐ Like a moderate amount

☐ Like a little

☐ Neither like nor dislike

☐ Dislike a little

☐ Dislike a moderate amount

☐ Dislike a great deal

How much does your child like sports?

☐ Like a great deal

☐ Like a moderate amount

☐ Like a little

☐ Neither like nor dislike

☐ Dislike a little

☐ Dislike a moderate amount

☐ Dislike a great deal

Does your child play any sport(s)?

☐ No

☐ Yes

☐ Cannot choose/Refuse

How much does your child like acting (whether on-stage or in front of the camera)?

- ☐ Like a great deal
- ☐ Like a moderate amount
- ☐ Like a little
- ☐ Neither like nor dislike
- ☐ Dislike a little
- ☐ Dislike a moderate amount
- ☐ Dislike a great deal

Does your child like to watch TV shows or movies?

- ☐ Like a great deal
- ☐ Like a moderate amount
- ☐ Like a little
- ☐ Neither like nor dislike
- ☐ Dislike a little
- ☐ Dislike a moderate amount
- ☐ Dislike a great deal

What are some of your child's favorite movies or TV/online shows?

Does your child like to read books or be read bedtime stories?

- ☐ Like a great deal
- ☐ Like a moderate amount
- ☐ Like a little
- ☐ Neither like nor dislike
- ☐ Dislike a little
- ☐ Dislike a moderate amount
- ☐ Dislike a great deal

How often do you read books with your child?

- ☐ A great deal
- ☐ A lot
- ☐ A moderate amount
- ☐ A little
- ☐ None at all

How often do you sing, play music or dance with your child?

- ☐ A great deal
- ☐ Click to write Choice 2
- ☐ Click to write Choice 3

Does your child like to tell stories?

- ☐ Like a great deal
- ☐ Like a moderate amount
- ☐ Like a little
- ☐ Neither like nor dislike
- ☐ Dislike a little
- ☐ Dislike a moderate amount
- ☐ Dislike a great deal

Has your child demonstrated the ability (even a little) of doing any of the following? (check all that apply)

- ☐ Writing with a pen
- ☐ Typing with a keyboard
- ☐ Texting on the phone
- ☐ Talking on the phone
- ☐ Recording audio & playing it back
- ☐ Composing music
- ☐ Drawing comic books
- ☐ Drawing maps
- ☐ Taking photographs with a camera
- ☐ Creating animations on a computer
- ☐ Choreographing a dance (solo or with others)
- ☐ Acting on stage
- ☐ Writing a song
- ☐ Martial arts
- ☐ Searching on the web
- ☐ Programming code
- ☐ Creating video games
- ☐ Making movies
- ☐ Making websites
- ☐ Other

Please enter your name, email address and phone number below.

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Appendix G
Alphabetic Knowledge Assessment
Pre/Post Test

LETTER NAMING

Name: _____ Date: _____
Alphabet Assessment

Uppercase Letter Recognition

A	E	I	M	Q	U	Y
B	F	J	N	R	V	Z
C	G	K	O	S	W	
D	H	L	P	T	X	

Lowercase Letter Recognition

a	e	i	m	q	u	y
b	f	j	n	r	v	z
c	g	k	o	s	w	
d	h	l	p	t	x	

Appendix H

Entry Interview questions

Intro

As you are aware, the Drumball study is an early literacy acquisition study that seeks to understand the role rhythm and rhythm-based activities or technologies play in the language and socio-emotional development of children. To this end, there are 4 modes of play that the Urban Griot workshop uses to structure children's experience and to share with parents strategies to leverage the affordances drumming provides for early literacy acquisition. These include: SOUNDS, LETTERS, WORDS & PROVERBS

Pre-Questions

Can you share a bit about your personal background before becoming a parent? What was your primary occupation before hand? Any primary artistic endeavors (on consumer - producer spectrum)? Tell me your experience as a parent. What is your partner's role in your child's life? How long have you been together? Please describe family context. How old is your child?

Questions

Q1 - From your perspective, what are some words that describe your child
Try to get least 3 to 5 descriptors

Q2 - Does your child read? If so, when did your child start to read? What was it?

- Does your child have difficulties reading?
- Please describe your use of the modes of literacy acquisition (Sounds, Letters, Words, Proverbs)

Q3 → • Regarding his or her games: What does your child play with? With whom?

- Does your child participate in social activities with other children? Which ones? Where?
- Does your child relate easily to other children?

Q4 → • Regarding his/her literacy development with respect to the , what do you think are your child's strengths?

- What do you think are your child's difficulties, challenge areas or pain points?
- > Solicit multiple responses. Focus is feedback.

Q5 → • What do you think are your child's abilities and aptitudes that should be developed?

- What are you doing/have you done to encourage these aptitudes? Explain.
- > Aim for two reasons

Q6 - Besides the Urban Griot workshop, is/has your child been in any other music or arts-based program? Please elaborate.

Q7. How did you hear about Urban Griots, and why did you decide to join the study? What are you hoping to gain personally? What are you hoping your child will gain?

Q8. Anything else.

Appendix I

Exit Interview questions

About Your Child

Upon completing the workshop, what are your thoughts regarding your child's level of engagement with the literacy activities? At the workshop? At home?

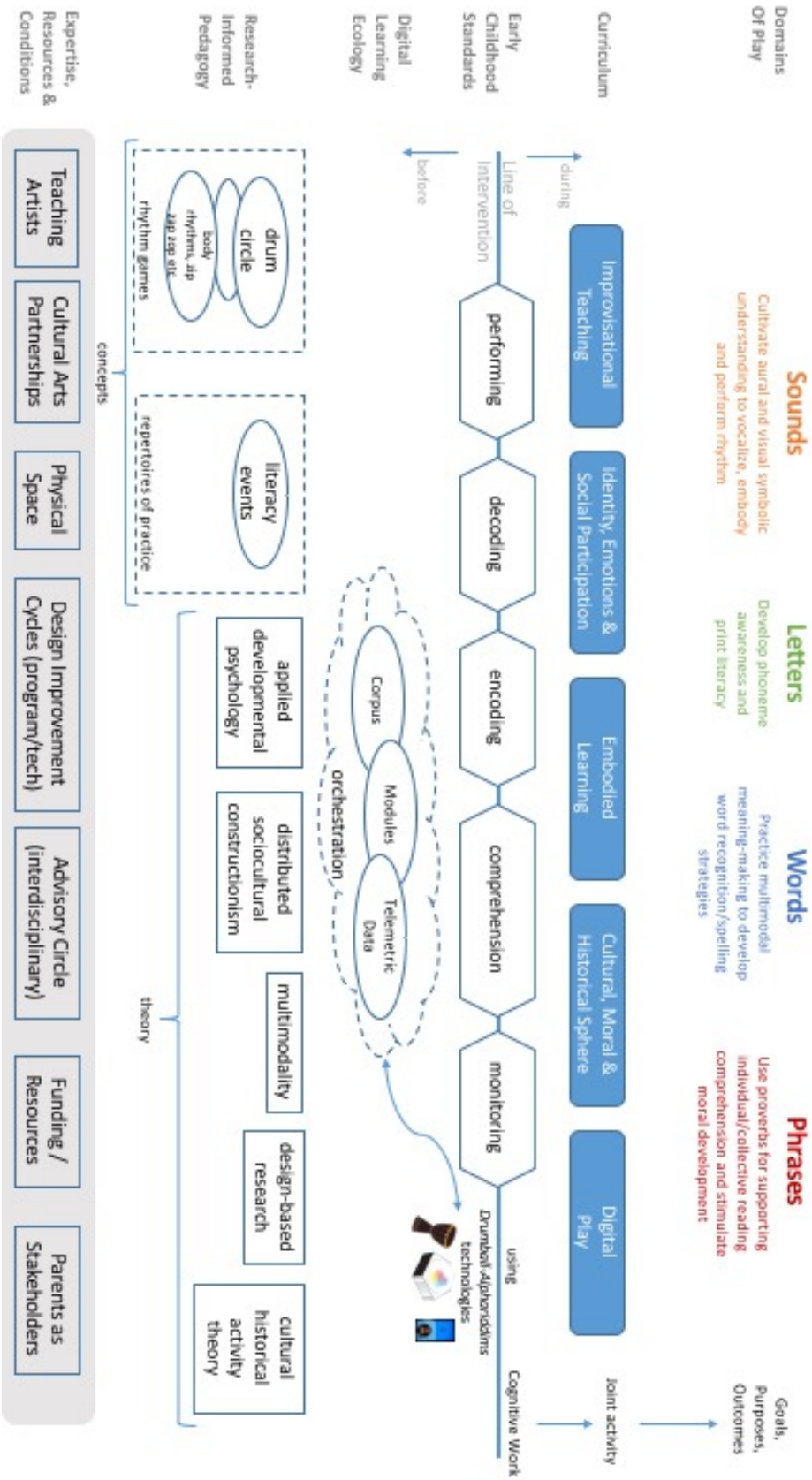
Anything you would like to share in terms of what you may have noticed concerning the impact of the workshop on his social-emotional learning?

About The Tools

what are some of the ways the tools provided from the workshop have been useful to you? This includes concepts of body rhythms, alghariddims, talking drum, song andn dance animation

Generally speaking, what are your thoughts on the viability of this culturally-grounded embodied approach to early literacy teaching and learning. Please explain.

Appendix J UGP Early Literacy Intervention Ecosystem



The UGP Early Literacy Intervention Ecosystem

The UGP signature pedagogy integrates embodied learning modalities through four Domains of Play in pursuit of the desired goals, purposes and outcomes of early childhood education. Figure 33 visualizes the broader ecosystem for planning and implementing robust early literacy interventions. By ecosystem, I mean the relationships, resources and supportive infrastructure to carry out the work.

Using a layered representation, the bottom level consists of the necessary conditions to support the intervention, namely: a viable physical space, human expertise (arts mentors, cultural and interdisciplinary advisors), community partnerships (especially involving parents), funding, resources and lastly, ongoing refinement of the program and technology infrastructure through design cycles.

The next level up is the research foundation of the intervention. Some salient concepts and theories include: rhythm games, repertoires of practice, distributed sociocultural constructionism, applied development psychology, design-based research and cultural historical activity theory.

The digital learning ecology makes up the third layer up as it orchestrates and integrates the research-informed pedagogy by embedding the theory, practices and concepts into the learning environment across face-to-face and digital contexts.

The fourth layer is the Early Literacy Standards rubric which guides and rules the UGP activity. In essence, the rubric translates the theory and practices into social dispositions and cognitive competencies that can be observed (and sometimes measured) at the intervention level. The five indicators are based on the national standards for Music and Literacy at the Pre-K/K level.

At the fifth layer is the Curriculum which provides the content of the successive sessions in the family workshop. The curriculum is informed by the bottom four layers (before the intervention) and supports the pursuit of the desired object-outcomes of the activity through pedagogical strategies centered on joint child-parent activity.

Finally, the Domains of Play frame the early literacy experience by integrating multiple embodied modalities (voice, rhythm and movement) into children's experiences within the workshop to promote literacy behaviors for the purposes of identity and socio-emotional development. Some have sought to investigate how digital tools can and do integrate into play-based programmes (Edwards 2013; Moore 2014). Researchers posit that digital devices and software can act as a developmental tool, that can enhance children's play and that digital play is a new cultural condition that needs to be better understood. Through the hybrid learning ecology, it is possible to implement the Domains of Play across face-to-face and digital contexts. For example, access to the digital corpus and activity modules from home allows those parents registered on the UrbanGriot.org platform to involve siblings and extended family in learning the concepts and improvising new kinds of literacy events that involve singing, instruments and dancing. Or with the *Alphariddims* app installed on a personal mobile device, children can accelerate their acquisition of alphabet letters and vocabulary words.