

**THE AFFORDANCES OF LAUGHTER IN AN AFTERSCHOOL STEM  
PROGRAM FOR MULTILINGUAL LEARNERS**

by  
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*This thesis is dedicated to the youth who participated in the afterschool program*

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## LIST OF SYMBOLS

### Conversation Analytic Notation

Notation	Meaning
<u>Yes</u>	Underline is used to indicate moments where multimodal transcription overlaps with speech. Underlined pauses ( <u>3.0</u> ) indicate the multimodal annotation below the underline in italics occurs during these moments.
<b>yes</b>	Words transcribed in <b>bold</b> are in a language other than English.
(. )	Micropause. A hearable pause but one that is 2/10ths of a second or less
(3.0)	Pause. Timed in seconds
(0.5)	Pause measured in tenths of seconds
hah	Open mouth laugh particle
hnh	Closed mouth laugh particle
heh	Open mouthed laugh particle
(h)	Laugh-like sound within a word which can be heard as audible aspiration within the word
•hhh	indicates an inbreath with audible aspiration
£yes£	smile voice within utterance
θyesθ	Breathiness within utterance
◦I think◦	Marks decreased volume of materials between
YES	Pronounced at a noticeably louder volume than surrounding utterances
[	point of overlap onset
]	point of overlap termination
=	no break or gap between adjacent utterances OR same speaker turn continuation, with overlapping talk leading to line addition
.	Low fall in intonation
?	High rise in intonation
↑	local rise in pitch on following sound(s)

↓	Drop in pitch on following sound(s); marked before sound, normally lasting a single syllable repeated if pitch rise continues or is reintroduced in subsequent words
ye-	Sound cut off
>yes<	Talk produced at a more rapid pace than previous surrounding talk
::	Lengthening of previous sound (more colons indicates longer sound stretch)
( )	Indecipherable speech; parentheses may contain approximation of sounds

Notation adapted from: Glenn, 2003; Ford & Fox, 2013; Jefferson, 1984;

## ABSTRACT

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All though laughter is traditionally thought of as divergent from the goals of science learning, this perspective seems to be a cursory assumption about which little empirical evidence is provided. Taking a situated and embodied approach to learning, this study details the affordances of laughter in an afterschool STEM program for resettled Burmese refugee high school youth. The informal learning setting in the afterschool program provides a space where laughter is often present, yet the meanings of laughter in these settings are not well understood. Through micro analysis of video data collected from the afterschool setting, three interactions between youth and facilitators in the setting were examined to investigate the work that youth's laughter does in the moment to challenge insular concepts of science discourse. Interaction ritual analysis was used to theorize the examined interactions' connections to other moments in the learning setting. In doing so, the affordances of laughter were found to be its work in generating solidarity, democratizing power relations, and providing ways to deal with uncertainty in science. Overall, findings from this research indicate that the informal learning context and responsive pedagogy provided important localities for youth to draw on their resources and they do so even in seemingly insignificant moments along the margins of what is traditionally considered to be science discourse.

## CHAPTER 1. INTRODUCTION

### 1.1 Introduction

Science has been constructed historically and philosophically to be serious business (Conlin, 2012). In inquiry learning and collaborative settings, there is often a blending of practices happening as learners engage with science. These settings and the interactions within them provide grounds for understanding how learners relate and negotiate their experiences and knowledges in science. For marginalized learners, the processes by which they negotiate these resources are important for created space for them to move from the periphery to central within science learning spaces. The purpose of the study detailed in this thesis is to investigate the interactional work youth do around moments of laughter within an informal science inquiry setting. As laughter is an understudied topic in science education, I review literature from the domains of linguistics, educational philosophy, language learning, and science education to ground the inquiry detailed in subsequent chapters.

### 1.2 Laughter in Interaction

Within linguistic there is an area of research which draws from the empirical work of conversation analysis and ethnomethodology to understand laughter as part of interaction. Gail Jefferson can be credited for beginning the field of studies of interactional laughter with her work focusing on how interlocutors resist joining into the laughter (1984) and how laughter is placed within talk about troubles (Jefferson, 1985). Drawing from an interactional sociolinguistic tradition, Philip Glenn pioneered a field of interactional studies of laughter (Glenn, 1989, 1991; Glenn, 2003; Glenn & Holt, 2013). His work has laid the groundwork for how speakers initiate laughter with those who they are speaking to when multiparty interactions are taking place (Glenn, 1989) and when two speakers are sharing in interaction (Glenn, 1991). Researchers working in this tradition have explicated laughter's various locations relative to talk (Ikeda & Bysouth, 2013) and offered ways of notating laughter as both an accessory to speech (Glenn, 2003), laughter's auditory aspects (Hepburn & Varney, 2013), and in conjunction with modes such as gesture and facial expression (Ford & Fox, 2013).

Findings from this pragmatic approach to laughter illustrate how laughter is implicated in facilitating relationships, constructing identities, and making meanings (Liang, 2015). Laughter has been found to do interactional work to facilitate relationships. In turn taking, a laugh may signal to the others in the interaction that one is taking a turn but does not intend to pursue their turn further, providing space for another interlocutor to take up in interaction (Ikeda & Bysouth, 2013). Laughter can also precede one taking the floor, providing an open in interaction (Ikeda & Bysouth, 2013). These kinds of laughs are different in their patterns and signal to others what will happen or what the speaker intends to do.

Laughter can work to explicate power asymmetries, as the situation presented in employment interviews where the interviewer provides laughable actions and sharing laughter to put the interviewee at ease (Glenn, 2010). Through laughter, the asymmetric distribution of power where the interviewer has higher status and the power attributed to the position in the interaction is reified. The within-moment indication and negotiation of power provides the groundwork for more lasting power asymmetries. The power attributed to a position and one's identification with that position can be upheld through the interactional work of laughter.

Laughter's interactional work can operate as an identity tool. Those working in the interactional approach to laughter have offered findings that laughter in conversations where the speaker is complaining can help to do interactional work to avoid being identified as the sort of person who complains (Clift, 2013). Within multiparty interactions laughs have been shown as a way to take a bid for an individual to begin speaking, opening up a space for providing input in the interaction (Ikeda & Bysouth, 2013). On an interactional level, laughter can provide access to speech in interactions and also pushes us to look beyond speech as a way of gauging participation in interaction. Laughter's ambiguous nature allows it to do two things at once: constructing identity and drawing attention to the tentative nature of identity (Liebscher & Dailey-O'Cain, 2013). In taking up theory of place identity: identity which is constructed relationally, connected with membership categorization, and rooted in geographic location, laughter can help to understand place identity. This form of identification has been shown to affiliate one with a nationality, such as in the case of a German expatriate laughing to affiliate with being German Canadian (Liebscher & Dailey O'Cain, 2013). Laughter exposes the tensions of identity and its ambiguous construction, offering a way to promote the tension of laughing *with* or laughing *at* (Glenn, 2003). Taking up and sharing laughter when one is not the addressed recipient of an utterance or action within an

interaction provides a way to do affiliative identity work (Clift, 2016). For instance, when interacting in a triad and two people speak with one another, while the third person laughs along with the action of the last speaker. Laughter's work can also be disaffiliative as in the instance of an interlocutor in a triad can construct the last speaker's utterance as preposterous through laughter—distancing themselves from the content of the utterance which is then rendered as laughable (Clift, 2016).

Laughter's facilitation of relationships, explication of power differentials in interaction, and identity work provide a rich context for the interactional importance of laughter which imply that the interactional work laughter does can run across educative contexts such as classrooms and informal learning settings.

### 1.3 Laughter in Educative Contexts

Laughter has historically garnered attention across the philosophical canon. John Morreall's (1987) historical mapping of theories of laughter traces three lines of thinking on laughter: Plato's proposition that laughter as a way to show having feelings of superiority, Kant's theory of laughter as pointing to an intellectual realizing of something as incongruous, and Freud's theory of laughter as a way to relieve pent up nervous energy created by a situation about which laughter develops. These perspectives show how laughter is a complex communicative entity. Laughter can be seen negatively as a way of asserting a higher footing over someone else, as a way to show understanding, and as a way to reconcile with the ambiguity inherent in interacting in a world that is constantly offering the unexpected.

Laughter has been theorized in the philosophy of education literature as important for learning as embodied and as a strategically used interactional tool (Gordon & Mayo, 2014). Laughter's educative meaning has been theorized as a means of producing solidarity, democratizing (Vlieghe, Simons, & Masschelen, 2010), and helping learners to deal with uncertainty (Stengel, 2014). There are some philosophical divides on just what kind of laughter is needed for laughter to be considered democratizing. Joris Vlieghe et al.'s (2010) theoretical work on what he calls "pure laughter," or the kind of laughter that is completely uncontrollable and renders laughers as one with their bodies is what he sees as democratizing. This laughter is of the embodied sort and makes us truly equal because anyone engaged in the laughter is part of, for a brief moment the collective, regardless of any pre-ordained status. Laughter in this vein requires

an open approach to classroom spaces by instructors. York points out the importance of teachers and facilitators to be able to react to the democratic moment of laughter as a locality for democratic construction of the classroom. York (2012) points out that supporting this type of laughter can be precarious for teachers and requires an ability to manage the interactional dangers that laughter presents.

Taking a critical lens to laughter allows for it to be a space for growth— “an opening in which a self unfolds” (Parvulescu, 2010, p. 5). Laughter can thus be read as creating space for pushing against oppression. Laughter questions those who are holding power and disrupts the dominion they hold over others (Parvulescu, 2010). In taking a power analysis of laughter, laughter offers a lens to review the learning of youth who are traditionally marginalized in school settings. For example, in addressing learner’s participation in play in unscripted contexts of media making, laughter is seen as additive to youth’s development rather than grounds for reprimand (2015). In her work with urban youth, Vasudevan describes how boys’ bodies who were creating film were caught up in laughter. Laughter works as a medium through which play is worked and produced. Laughter provides a window through which youth’s play is a way to imagine possible selves. The way in which this play is interpreted can have ramifications across youth’s lives, especially in the case of youth who are culturally and racially non-dominant. Opening up the lens of interpretation to encompass laughter as a central modality of play and learning provides a means to question how play is interpreted. By taking a generative stance in interpreting youth in laughter, laughter is central to the authoring of selves, but always in tension with the institutional contexts which have particular agendas for how youths’ bodies should be configured (Vasudevan, 2015). Play does not stop after early adolescence, play can be seen as a frame for interaction through adulthood, signaled to others through verbal and non-verbal means as well as the semiotic content of utterances (Glenn & Knapp, 1987).

Work examining joking relationships constructed between teachers and students at a Swedish high school for those who had dropped out of traditional schooling found that these relationships helped students and teachers to engage in bidirectional cultural exchange which helped for better educational outcomes (Lund, 2015). This exchange also helped to shift perceptions of immigrant students for the teachers as they looked to engage authentically with students, showing how joking relationships fit within the greater social institution of the political climate (Lund, 2015). These relationships were a way for both students and teachers to engage in

social criticism, thus creating a more democratic learning environment (Lund, 2015). Rather than indicating that teachers ought to engage in joking to get students to like them, Lund shows that taking up youth's styles of joking when invited was important for teachers to authentically engage with students. Indeed, laughter's indication of social connections within learning spaces has been a way to assess how schools support relationships between teachers and students. Johnson proposed a laughter as an indicator for whether or not schools were adhering to audit culture (2005). This indicator is contextualized within the United Kingdom to show how classrooms where laughter is present are supporting students learning rather than using test scores as measures of student learning (Johnson, 2005). Laughter indicates a shift in the purpose of education to support youth's development and becoming rather than adhering to testing metrics which do not realize the importance of social interactions and relationships in the process that is learning.

#### 1.4 Laughter and Language Learners

Laughter has been examined in informal settings with language learners. For example, Stewart (1997) examined the interactions between family members speaking Spanish and a non-native Spanish speaker. Laughter was shown to be an important aspect of conversation whereby language learners signal attention to the spoken conversation and to indicate shared understandings or at least to save face (Stewart, 1997). The shared relationships between the family members and the guest were important as well as the setting where the interactions took place in interpreting meanings of laughter (Stewart, 1997). From a position that values the situated interpretation of joking as speech activity, laughter may be seen as a signal that learners have acquired the sociocultural knowledge and interpretative ability to participate fully in conversational joking (Davies, 2003). A language learner laughing as the recipient of a jokes indicates to the initiator of the joke that they realize the communicative intent of the joke (Davies, 2003). Joking exposes the contingency of the moment in communication and for language learners, learning to make sense of conversation unfolding in real time provides space for these learners to collaborate through laughter (Davies, 2003). This claim is not without reproach as others have shown that learners can laugh and joke even at the beginning of learning a language (Bell, 2009). Laughter shows the tensions inherent in second language learning as students learning a new language often laugh in the face of what they cannot do (Stengel, 2014).

Jacknick (2013) showed shared laughter as signaling alignment between students when challenging teachers' epistemic authority within language instruction. By laughing when the teacher was confirming an answer, students showed that they did not agree with the answer being given and therefore drew attention to their resistance to the teacher's epistemic authority (Jacknick, 2013). This sort of laughter draws attention to the tentative nature of the teacher-student interaction, especially in the English language learning classroom where the teacher is often positioned as an expert on the correct way to use language. Laughter also facilitates students' interactions with language in peer-to-peer conversations. Laughter facilitated the use of English language in the speaking of students who spoke Taiwanese as a first language (Liang, 2015). Laughter was a part of the language play students used to switch between their home language, Taiwanese, and that of the language they are learning, English. Laughter around language play in a Spanish-English science learning setting showed that Mexican adolescent newcomers used play to collectively work to make space for their learning, resulting in moments of laughter and joking between languages (Bruna, 2010).

### 1.5 Laughter and Science Learning

Laughter and humor are not often the focus of research in the science education literature. Science traditionally has not been constructed as accepting of laughter within its disciplinary contexts (Jaber & Hammer, 2016). Within science learning settings, laughter is usually purported to be a signal that students are "off task" (Bruna, 2010). Furthermore, the lecture type style in which science education settings has traditionally been constructed is not conducive to discussion type interactions where laughter is prevalent (Nesi, 2012). Much research on science learning focuses on what is considered science content, but becoming a knower and doer of science has is argued to be a process of embodying and practicing disciplinary ways of feeling and thinking (Jaber & Hammer, 2016).

To investigate the process of engaging in disciplinary science requires examining science inquiry settings and close analysis of interactions where laughter takes place. Research focused specifically on the production of humor in undergraduate chemistry laboratories, shows how emotions involved in learning are of particular importance in inquiry science learning settings (Lamminpää & Vesterinen, 2018). This line of inquiry provides a view of the importance of the production of humor and laughter in inquiry science learning where the work is not just

collaborative, but is student centered. Their approach counts and categorizes instances of humor by use, showing that humor is both integral and versatile in collaborative science inquiry settings especially for the regulation of negative emotions (Lamminpää & Vesterinen, 2018). They call for an examination of *how* social interaction and social emotional regulation are produced in humorous interactions in science learning, exacting a need to address the mechanisms of humor in conjunction with science learning.

Laughter examining discourse unfolding in classroom science settings shows laughter and joking can help participants say what they think in collaborative sense-making taking up laughter in conjunction with humor and irony, “can play a substantive role in the doing of science and in building shared understandings more generally” (Conlin, 2012, p. 143). Building shared understandings is accomplished through management of affect and distancing where humor helps to shield and intellectually distance students from being directly attached to their ideas (Conlin, 2012). Laughter has been shown to create solidarity between teachers and students by allowing them to connect through joke making (Roth et al., 2011), and play an integral role in students’ conceptual understandings in enacted curricula (Roth, 2009). Yet, this seemingly beneficial manner of laughter and joking is also implicated in drawing lines about what is science and what is not science. Berge and Johansson’s work showed how jokes are produced in physics lectures across three universities in the United States and Scandinavia in ways that may be less beneficial for students’ interactions with science (2017). They show how the jokes made by professors in lectures constructed physics as a discipline that is very difficult and physicists as people who are obsessed with their work. For example, physics is purported to be very advanced and difficult when teachers ironically refer to it as ‘easy’. By creating jokes that incite laughter, they may be invoking students to draw on a narrow or stereotypical perspective on who does physics and what constitutes the acceptable emotions to feel about physics work. These jokes and the humor associated with them can thus be seen as problematic by enforcing normative discourses about science. Humor has both supporting and constraining roles in participation in science, however, humor and associated laughter is often discounted in science (Conlin, 2012; Roth, et al., 2011; Berge, 2017).

In a review of the literature I found three empirical studies on laughter reported in the science education literature (Roth, 2009; Berge, 2017; Roth et al., 2011). Laughter has been shown to be significant for conceptual change in science learning settings (Roth, 2009). Roth showed that

laughter is important in the practice of the curriculum within a setting and as a way to show recognition of correct as opposed to incorrect content knowledge (2009). This discussion laid the groundwork for the relevance of examining laughter as a mediator of learning within classroom settings.

In taking up classroom studies of laughter, Roth, Ritchie, Hudson, and Mergard (2011), undertook and extended empirical investigation of laughter during a teacher's facilitation of science lessons in a seventh-grade science classroom in Australia. Laughter in this study focused on the meanings of laughter within the typically produced IRE (Invitation-response-evaluation) style of discourse (Roth et al., 2011). They show how laughter enforces this style of classroom discourse which is typically present in lecture-type styles of interaction. Allowing for student laughter or inviting student laughter within the framework of IRE discussions provided a way for the teacher to affiliate with students and potentially to build solidarity (Roth et al., 2011). Laughter is pointed to as doing important work of producing solidarity and intimacy between the teacher and students and recognize its importance for climate in classroom environments. While their focus on science learning leads to a conclusion of supporting designed-for laughter, I push back against the inclination that instructors should attempt to make students laugh, rather teachers should seek to form and facilitate the types of relationships where laughter can take place in science learning. Laughter that is student-focused rather than teacher-focused may provide a narrative of the affordances of laughter to do interactional work for students.

Theoretically, this study offers important dialogue on how laughter in science classroom spaces can be the focus for questioning the pervasive belief in science classrooms that science learning requires discarding other explanations for the accepted scientific explanation of phenomena (Roth, Ritchie, Hudson, & Mergard, 2011). Roth and colleagues recognize the connection between institutional relations of power and negotiations through laughter (2011). For example, the unequal power distribution constituted through IRE discursive patterns is turned on its head when a student introduces a response which is obviously outrageous or wrong and leads to laughter. As the area studying laughter in science learning is still in its infancy, the authors provide suggestions for future research on laughter. I seek to contribute to conversation on question that the authors pose: "What is the function of laughter in holistic (culturally sensitive) science classrooms that are not geared to prepare students for high-stakes testing?" (Roth et al., 2011, p.

456) Essentially, what is the interactional work of laughter for students in informal science learning settings?

Further work focusing on laughter in science learning has linked laughter to humor. Berge provides an interactional view of *how* humor is produced in undergraduate physics collaborative inquiry (2017). Taking up a cultural view of learning (Hodkinson, Biesta, & James, 2008), Berge approaches humor as occurring within a disciplinary discourse. Berge's conversation analytic approach contributes a focus on the discussions had in approaching physics problems, or what can be termed "On-task" discussions where students were talking about science. The cultural approach to science discourse allows them to see that the discussions had within the physics classroom were part of larger organization as it reveals connections to norms coming from the wider science community (Berge, 2017). Berge saw student's laughter to signal an awareness of the embedded stylistic norms of scientific language and the norms of science classrooms (Berge, 2017). Further, she connects instances of humor to norms of science discourse and talking science (Lemke, 1990). Examining humor at the interactional scale at which the social organization of science operates provides a way to uncover the norms of the science community embedded within them. These norms are that of science being only for an elite group as in the humor students draw on about the difficulty of physics problems (Berge, 2017). Looking interactionally at laughter can be a way to see how norms are either subverted or perpetuated. Additionally, it shows discussions primarily within Swedish language can be examined through the lens of conversation analysis, providing precedence for examining science discourse in languages other than English.

Humor and subsequently laughter, is rife within inquiry science learning settings (2017). The small body of literature of laughter and humor studies in science education show the importance of studying laughter in science learning contexts. These settings offer opportunities to observe learning as collaborative work. In informal science learning settings specifically, the inquiry format offers much more flexibility for students to take ownership of the space. I seek to understand how youth negotiate their power through laughter in this type of learning setting in order to make sense of how contexts shape learning. Further, video data collected of student interactions provides an underutilized opportunity to expand inquiry beyond approaches to laughter focused primarily on audible aspects of communication in the production of laughter and humor.

## 1.6 Informal STEM Learning Settings for Refugee Youth

Informal science settings have been shown to be sites for racially, ethnically and socioeconomically diverse youth to participate in science learning that fosters their engagement and positive science identity development (Rahm, Martel-Reny, & Moore, 2005; Calabrese Barton & Tan, 2010). For example, in a study of a summer program for 40 urban youth, the informal provided space to engage with science in ways that were familiar to them and allowed them to develop confidence (Rahm, Martel-Reny, & Moore, 2005). Though science is traditionally thought of as part of the dominant culture, urban youth from diverse socioeconomic and ethnic backgrounds blended their cultural practices to learn science in ways that support their learning about both themselves and science knowledge (Rahm, Martel-Reny, & Moore, 2005). Science practices were done differently than what might be found in a typical classroom, but the complex and factually valid nature of science was preserved (Rahm, Martel-Reny, & Moore, 2005). This blending of science practices with those of youth's own practices was also shown when youth agentively positioned themselves in their science learning by taking science into their own hands to investigate anthropogenic heat generated within the urban area where their community was located. Their video documentaries showed them placing themselves as knowers of science from the context of the city they lived in and as change makers as they used their knowledge to communicate their findings to improve the communities they live in (Calabrese Barton & Tan, 2010). Learners coming from socioeconomic and racial-ethnic backgrounds that are not dominant in science blend their cultural identities and practices with that of science in informal spaces that is productive for their participation in science.

There is also a dearth of research on resettled refugee youths' experiences in science learning settings (Tan & Faircloth, 2017). Informal science learning settings are often some of the only localities of participation for refugee youth in science learning (Tan & Faircloth, 2017). What is known is that informal science learning environments provide important locales for refugee youth to leverage their identities for science learning such as the identity as a sibling in engineering-science activities where youth wanted to engage in making multiple toys for their siblings (Tan & Faircloth, 2017). This sort of identity development shows a blending of science and engineering with youth's everyday identities which is important for youth's identity development.

Previous work within the afterschool STEM setting from which this thesis comes explored the importance of informal learning settings as spaces for refugee youth to blend their identities

with that of those being negotiated in the afterschool setting (Ryu, Tuvilla, & Wright, 2019). One such way that youth negotiate their identities in this setting was through collaboratively joking with one another in the setting to blend identities of being a joke-maker with that of a scientist (Ryu, Tuvilla, & Wright, 2019). This finding occurred within the first year of the afterschool program (2015-2016), The identity lens provides insights of being how youth negotiate their identities with that of being a science learner.

In the study detailed in this thesis, I continue and deepen the inquiry around joking by examining the work it does for the emerging learning context during the second year of implementation (2016-2017) with a different group of learners from the same population studied in Ryu, Tuvilla, and Wright (2019). In doing so I bring focus directly on laughter and the interactional work it does affords youth's participation in science learning within informal science learning contexts. Further, I seek to contribute to recent work that recognizes the importance of joy and laughter for productive participation in science learning settings (Scipio, 2017). Joy is an important form of science disciplinary practice and the tangle of emotions associated with challenges in science learning is important to attend to develop understandings of how emotion is tied into science practice (Jaber & Hammer, 2016). Findings from a learning setting using technology and play for science learning, show children enjoying themselves and embracing silliness while examining and embodying particulate phenomena (Keifert, Dahn, Illum, DeLiema, Enyedy, & Danish, 2017). Just how laughter fits within the fabric of joy in informal settings and how it helps to broaden concepts of science learning is a dialogue to which this thesis provides a contribution.

## 1.7 Context and Motivation

Taking up a discourse on the importance of laughter requires an understanding for the motivation of this work. This work takes place within an informal STEM learning setting for resettled Burmese refugee high school youth. As such, learners in this setting were multilingual and spoke English as a second or third language creating a unique science learning context, where youth worked between multiple languages while interacting in the science learning setting. Many of the youth from this population reported being marginalized based on their race/ethnicity and language within school spaces (Ryu & Tuvilla, 2018).

This setting is especially relevant for inquiry into laughter for several reasons: informal science learning settings are full of laughter, science education does not historically take up laughter to be a part of science learning, and science education does not traditionally take up its learners to be racially, ethnically and linguistically non-dominant. Laughter provides a lens to view the interactional work done at the margins of science learning. By centering interactions around laughter, I seek to understand what participation in these moments affords for learners and their participation in science learning.

## 1.8 Conclusion

Laughter and its interactional meanings show that laughter does significant interactional work and can allow for the reading of power in interaction. The literature shows that there is a small amount of work pertaining to laughter and humor being done in science learning contexts, within these studies laughter is shown to be part of facilitating understanding (Roth, 2008), drawing out students' ideas (Conlin, 2012), doing relational work between students and teachers (Roth et al., 2011), and facilitating learning of normative science discourse (Berge, 2017). I seek to expand inquiry into science discourse through laughter. In doing so, I contribute to the growing body of literature which places importance on laughter in science education contexts and draw on democratic understandings of laughter as the basis for investigating what laughter does for youth's participation and learning. As articulated by Glenn and Holt (2013), laughter occupies a space on the fringes of many disciplines. The study in this thesis provides further dialogue to connect disciplinary interests along the lines of learning and laughter.

## CHAPTER 2. CONCEPTUAL FRAMEWORK

### 2.1 Introduction

In this section, I articulate how I take up a sociocultural and participatory approach to learning science. Learning can be defined as participation in the culturally defined practices of a discipline, namely in science discourse. I then review how science discourse has been canonically defined so as to limit the participation of marginalized youth in science learning. In the face of these deficit discourses, I align myself with assets-based approaches to learning and articulate the resource-rich frame through which we view youth in the setting. I draw on theory of interaction ritual chains (Collins, 2004) to theorize the production of structure through micro-interactions and their significance for learning. I then connect these views to articulate a theory of laughter as my focus for interaction rituals and theorize how it can be a way to access the rich resources that youth bring to the setting.

### 2.2 Situated Learning and Embodied Perspective on Learning

Broadly speaking, I align my work with that of researchers who view learning as socially and culturally mediated (Vygotsky, 1986). Within this tradition, social interaction is the locality where learning resides and interaction lies within greater social and cultural structures that provide the tools for how to operate within these interactions (Lemke, 2001). In taking up this sociocultural perspective on learning, I draw on situated understandings of learning to make sense of when and where learning takes place within a community. Lave and Wenger's influential theorizing on communities of practice lends an understanding of learning as situated in practice (1991). In their situated learning framework, individuals come to be a part of a group by beginning to be involved, legitimately if however, peripherally, in the practices that make that group into a community (1991). Lave and Wenger contend that learning is collaborative and practice-based. Learning is a process of increasing participation within a community of practice which consists of old-timers and new-comers. As new-comers become old-timers, the practices of the community are shaped, thus practices and the culture of the community are ever-shifting and evolving (1991). Within a situated perspective of learning, learning is understood as relational (Lave & Wenger, 1991). The mechanisms by which participation in the social practices to be a part of a community of learners

is of interest for making sense of how the community operates and how individuals are changed by interacting in the community. In drawing on a situated understanding of learning as occurring within a community of learners, I hold it to be especially important that the community is influenced by broader discourses that are not bound by the learning setting.

Jay Lemke's (1990) influential work on talking science shows when learners are immersed in talking science, they are part of re-creating a scientific community that holds certain beliefs and values. Scientific values have been implicated in perpetuating racializing, masculinizing, and colonizing agendas via artificial divides such as mind-body dualism (Harding, 1991; 2008;). Feminist science educators recognize these agendas at work within traditional ways of viewing what counts as knowledge in science education settings and work to marginalize learners who are not traditionally represented in science (Brickhouse, 2001). In an effort to push back against views that perpetuate White, middle- and upper-class values as standards for what is useful to draw on in science learning, scholars push for an ontological shift in how learning is viewed (Hodkinson, Biesta, & James, 2008; Dall'Alba, 2009). This shift recognizes learners as *becoming* and learning as a process of change in which learners find their voices to participate in the community of learners (Greene, 1995; Siry, 2011). Rather than an epistemological orientation to learning which privileges a view of learning as cognitive alone, learning as *becoming* recognizes that students are changed in ways beyond what can be evaluated through knowledge and recognizes that the body in its' wholeness is the site where becoming takes place. Instead of abstracting the mind from the body, an ontological approach frames learning through the entirety of experience (Merleau-Ponty, 2012). This framing opens up in relevance of all aspects of experience in the learning process, recognizing that emotional and practical aspects of experience are just as important for learning as the often-privileged cognitive aspects (Stolz, 2015). An embodied perspective requires the examination of in-moment learning by making sense of context in its entirety, recognizing that learning emerges from the materiality of the setting and learners' interactions with one another in the setting (Elmesky, 2005). Embodied interaction is composed of both what is done with the body in the space and what is done through verbal modes (Wilmes & Siry, 2018).

I contend that youth's learning is embodied participation within the science learning setting and recognize the process nature by which learning takes shape. Learning is embedded in and congruent with context. In taking this approach I recognize that learners' participation in the setting provides the embodied locales for interaction. In examining learners' interactions in the learning

setting, the process nature is honored and explicated. These interactions are sites of sociocultural interaction and provide sites for the sociocultural construction of learning as becoming. Viewing learning as relational requires an understanding of the kinds of participation that are valued within the setting. Hodkinson, Biesta, and James (2008) ask “what is/should be the valuable learning in any particular learning culture, or for any particular learner or group of learners?” I take this issue to task by taking a critical lens on what should be valued as part of learning. In doing so I draw on resource rich views of learners.

### 2.3 Resource Rich Perspectives on Learning Science

I align my work with researchers and educators who recognize that *all* youth bring valuable resources to science learning settings (Elmesky & Tobin, 2005; Schademan, 2011; Chigeza, 2011; Siry, 2011). Resources in this frame have been considered the cultural practices from learners bring from their communities (Schademan, 2011) and the epistemological resources that learners bring to bear in science learning contexts (Siry, 2011). In this way, non-canonical recourses such as traditional game play (Schademan, 2011) and youth’s imaginary life worlds revealed through play (Siry, 2011) provide resources for science learning, allowing for the valuing of learners’ different perspectives and ways of knowing science (Siry, 2011). Practices which may be marginalized in traditional science learning spaces can be seen as connections to youth’s lives that provide contexts for authentic learning. In taking this explicitly critical stance on youth’s knowledge and resources, I recognize the culture of science education has not historically been accepting and open to learners’ resources, instead asking youth to leave their everyday practices at the door to acculturate into science disciplinary practices (Warren, Ballenger, Ogonowski, Rosebery, & Hudicourt-Barnes, 2001). In recognition of the widespread deficit orientations to their knowledges and practices that youth, especially those with minoritized identities, interact with science classroom contexts, youth’s experiences in science education may have enforced their perspectives of science education spaces as insular. Taking up a recourse rich frame rejects deficit lenses that purport racially and ethnically non-dominant youth to be at blame for their lack of academic achievement in science, instead questioning the ontological construction of science as a discipline (Chigeza, 2011).

Resource rich views in science education draw from a range of perspectives on the resources youth bring to a setting and their enactment of those resources for learning. These views draw from

concepts of cultural capital (Bourdieu, 1977) and community cultural wealth (Yosso, 2005) to make sense of how resources are implicated in a given context. Bourdieu's (1977) philosophy provides a negotiation between social structure and agency in which individuals are able to leverage resources as cultural capital to negotiate structures. For culturally and racially marginalized learners, Yosso's (2005) cultural wealth model offers an important critique of Bourdieu's cultural capital through the lens of critical race theory recognizing that cultural capital has a narrow interpretation of what is valuable and thus is implicated in perpetuating systems of oppression for people of color. Yosso instead offers a theory of capital that recognizes communities of color as incubators of cultural wealth that is valuable for resisting oppressive forces and for learning. This view has been taken up as way to make sense of and value the resources coming from communities of African American youth for science learning (Schademan, 2011) and indigenous communities in Australia (Chigeza, 2011).

Scholars working in the resource rich orientation to science learning view culture as "dialectically conceptualized as a system of symbols, the associated meanings, and practices" (Elmesky & Tobin 2005). Drawing on Sewell's (1992) cultural theory of social structure, resource rich views call into question the dynamism of agency and structure and the resources implicated in negotiating structures. This view recognizes that cultural practice constructs the boundaries which make up what comes to be known as a field or discipline (Elmesky & Tobin 2005). Disciplines are loosely bound and practices which originate and develop in the culture of one discipline may carry over into another. Therefore, cultural practices which may have not been within the bounds of science can be drawn on for the learning of science discourses.

Drawing on youth's rich resources for learning requires an understanding of the ways in which their resources are negotiated with the existing social structures of the learning setting. In taking a cultural stance on resources, researchers recognize many structures are at play within any given science learning setting in every moment of interaction. These structures can be established socio-historically such as those represented by positioning through race, class, and gender (Tobin, 2012). These structures do not rely on categorical interpretations alone in that they are established in material spaces (Sewell, 1992). Cultural resources are employed in the practices of a setting to engage in the dialectical relationship between structure and agency (Sewell, 1992). This dialectic has been posed in the sociological literature as a way of attempting to make sense of more lasting social rules or patterns, i.e. structure, and how they are shaped through human action, or agency

(Sewell, 1992). Conversely, structure guides what can be done through agency. It is from this relationship and the simultaneous nature of being structured and structuring that fields are characterized and shaped (Tobin, 2012). Structure affords practice, but structure's dynamic nature means that it is not necessarily deterministic of practice. In examining the structure | agency dialectic from the direction of agency, Siry, Wilmes, & Haus (2016) examined how an individual student proposed and conducted scientific investigations through agentic participation in a science inquiry learning setting. They value youth's agency to work within social structures and also to change them (Siry, Wilmes, & Haus, 2016). Research focusing on youth's agency places the individual at the foreground (Roth, 2007; Siry, Wilmes, & Haus, 2016). I weave between individuals and group actions in examining the youth's negotiation of resources in the learning setting to interrogate the dialectic between structure and agency to make sense youth's negotiations of science discourse.

#### 2.4 Science Discourse is Culturally Constructed and Multimodal

Science practices have widely been constructed as objectivist, rational, precise, detached, and formal (Warren et al., 2001). These descriptors can be seen as aligned with historical interpretations of sciences as based in Western culture which places primacy on masculine, Eurocentric ways of knowing (Harding, 2008). As such, students who are White and middle to upper class are empowered by the culture of science which was designed for them (Elmesky, 2005). As such, Western cultural practices are entangled with the practices of science, and have implications for science discourse. Science discourse within science spaces is culturally constructed, as are the discursive practices common in science classrooms today. I recognize that science classroom discourse practices are the culmination of sociopolitical movements, educational policy, and trends in educational research (Siry, 2011). When immersed in science classroom learning, students learn the discursive practices of science, which are by nature, exclusionary.

Science practices are grounded in the medium of language which is grounds the discipline in spoken and written communication (Lemke, 1990). As youth learn science classroom practices such as following procedures, arguing from evidence, and hypothesis writing, they are asked to do so through language (Lemke, 1990). Scholars have noted that studying science discourse through the mode of language has limited the ways in which we can understand how communication is

achieved in science learning (Kress, Jewitt, Ogborn, & Tsatsarelis, 2014). Instead of thinking of communication through the framework of language alone, it is expanded to include all of the resources one draws on to convey meaning in science learning contexts. In this sense meaning is conveyed through resources such as gesture and manipulation of objects. A multimodal view of science discourse recognizes that interactional resources are culturally linked in that they are drawn from a set of meanings that are shaped over time (Kress, Jewitt, Ogborn, & Tsatsarelis, 2014). For example, the act of pointing to the ceiling in a science classroom is a way to integrate the cultural practice of pointing to the ceiling to indicate the sky (Kress, Jewitt, Ogborn, & Tsatsarelis, 2014). The meaning of this gesture is situated in the interaction taking place in the setting and is drawn from previously generated understandings. This understanding allows me as a researcher to value the ways youth participate through various modalities in the setting and to recognize that these interactional resources are linked up in broader systems of cultural meaning making.

Taking science discourse as a sociocultural construction reveals that disciplinary ways of knowing and being have not been constructed with or for all learners. For learners who are marginalized culturally and economically, school is part of a system that perpetuates cycles of inequity in society (Elmesky, 2005). For multilingual learners, the language standards for science education are often used as a means of justifying the exclusion of language learners from science content courses until such a time as they are proficient in the English language (Valdes, 2017; Grapin, 2019). The English language-focused viewpoint is enforced by the Next Generation Science Standards (NGSS Lead States, 2013), which push learners to be proficient in language practices such as argumentation, scientific writing, and reading. Keeping English proficiency as a gatekeeper for science learning is misaligned with both the complexity of disciplinary science learning and language acquisition as science practices have been argued to intersect with the processes of language learning (Quinn, Lee, & Valdes, 2011; Grapin, 2019). Science is a complex, multimodal content area in which proficiency in working across modes such as spoken language, representation, observation and disciplinary-specific writing are needed to accomplish the practices required of scientists (Kress, Jewitt, Ogborn, & Tsatsarelis, 2014; Grapin, 2019). Placing primacy on the modes of spoken and written language fails to recognize how science practices and discourses are learned through many modes which are integrated in complex ways and must be used in disciplinary-specific ways to achieve communication (Jaipal, 2010).

For linguistically minoritized youth, participation in class discussions may not be as freely available as supposed by educators who valorize participatory approaches to science learning. For example, perceptions of Asian immigrant youth as quiet have led some youth to be reticent to speak and may hinder their ability to participate in discourse-focused science learning (Ryu, 2013). The cultural construction of science discourse has implications for culturally and linguistically marginalized learners as learners are often asked to take up and participate in discursive practices that are outside of their everyday ways of communicating (Warren et al., 2001). The cultural construction of science discourse is implicated in the power dynamics implicit in science learning settings. Such as the power dynamic implicit in the structure of interactions in science learning settings in which youth and educators must negotiate disciplinary discursive norms. As White (2011) points out, the pressure that teachers exert to make students participate in whole class discussions can have adverse effects for minority students as they are pushed to take up dominant discursive styles. Some students may respond to these urges to take up dominant discourse with silence, which rather than being an indication that students do not know something, can be a strategy to resist participating in dominant discourse norms (White, 2011). This silence is its own form of negotiation of practices. With the recognition that science discourse may be enforcing inequitable social structures, for non-dominant youth an understanding of how to engage in academic discourse is needed to get the status needed to fully participate in these settings and overall to have the chance to change these settings and their discursive norms (White, 2011).

The multimodal view on science discourse is relevant for multilingual learners, as it uncouples English language proficiency from science understanding by recognizing that science learning and communication are achieved through many modes in combination with one another. For the purposes of inquiry here, I center analysis on the modality of laughter. To make sense of the ways in which learners negotiate science discourse, a multimodal lens provides a way to make sense of learning as a situated and embodied process. To address how situated moments taking place around laughter are relevant for youth's learning, I draw on interaction ritual theory.

## 2.5 Interaction Ritual Theory

Taking on an examination of learning through embodied participation in a learning setting requires an understanding of how micro-moments are linked into the fabric of the learning context and the sociocultural influences which shape those moments. To draw out the relevance of micro-

moments for learning science education researchers have drawn on the work of Randall Collins and his theory of Interaction Ritual Chains (2004). Interaction Rituals theorize how brief micro-moments are linked into the fabric of the emerging learning context, and the importance of these moments for the social bonds that youth negotiate for their participation in science learning (Wilmes & Siry, 2018). Interaction ritual theory aims to make sense of local and situational construction of meanings and how those meanings change individuals and in turn create and shape society (Collins, 2004). This theory provides a mechanism to make sense of the negotiation of institutional structure and how it relates to the interactional resources available in a given situation. Theorizing the production of structure through interaction provides a basis in local spaces where action takes place which may carry over into other localities. By placing primacy on the situation rather than the individual as the starting point for inquiry, this lens allows for an understanding of how microlevel interactions impact individuals and shape learning trajectories. This situational view refrains from mystifying macro-level discourses, or what has been termed *institutional structures*, as happening outside of people's lived experience (Collins, 2004), allowing for interactional analysis that recognizes that power is implicit in negotiations.

Collin's proposes the mechanism by which interaction rituals proceed to be composed of four ingredients: bodily copresence within a space, a boundary between those who are participants and those who are not participants, a common focus of attention, and shared emotion (Collins, 2004). In sharing interactions with a group where there is a buildup of mutual focus through entrainment to one another's actions and mood, collective effervescence builds as emotion and focus build—group meanings are made (Collins, 2014). Successful interaction rituals produce emotional energy (EE), solidarity, construction of shared symbols and production of feelings of morality (Collins, 2004). It is through entrainment to one another's emotions in an interaction group solidarity and identification with the group that lasting individual feelings of emotional energy can be generated and meaning can be stored in symbols (Collins, 2004). Situations where interaction takes place are the localities where cultural symbols come to take shape, feelings of group membership are sustained, and interest in group practices come to take shape (Collins, 2004; Olitsky, 2007). In this process, the group creates and negotiates meanings. These meanings can be converted into feelings of morality or stored via emotional energy in symbols. When meanings are linked up to other moments where the emotional energy stored in an object or ritual is revisited or recharged, it is called an interaction ritual chain (Collins, 2004).

In taking up this view in science education, researchers have shown that interaction rituals can serve as sites for fostering group membership in science learning settings, even for learners who were initially reticent to participate (Olitsky, 2007). IR theory has also provided a mechanism for making sense of the engagement of students during demonstrations over the course of a high school chemistry class (Milne & Otieno, 2007). Engagement has been further conceptualized using IR's to focus on the significance of collective emotional engagement for science learning (Olitsky & Milne, 2012). The resource rich frame has been used in conjunction with interaction rituals for multilingual learners in science to make sense of the production of solidarity (Wilmes & Siry, 2018). In Wilmes and Siry's (2018) multimodal interaction ritual analysis, they saw that a student who did not initially engage in the language of instruction in an inquiry-based science class moved to a peripheral position in interactions to a more central position. Initially, he maintained his gaze and body position showing engagement while removing himself from direct participation in group inquiry activities. Through repeated group interactions, this student gained confidence to participate and work in synchrony with other group members.

These studies show IR theory does important theoretical work to connect the significance of small moments in the context of other moments within a learning setting. The micro-moment has significance as it is from many micro-interactions that we come to arrive at the meso-level understanding of the learning setting. What comes to be known as the learning context is composed of every micro-interaction that has taken place in that setting. In theorizing learning this way, I seek to make sense of the significance of micro-moment interactions and the emotional energy accrued in them to connect to other such moments in the learning setting. Furthermore, the production of macro-level structures can be accounted for through the negotiation of micro-interactions as it is from the micro interaction that the macro-level structures such as that of formal education come into being (Roth & Tobin, 2010).

Previous research using interactional theory in science education contexts has found that prosody (the patterns of stress, pitch, and speed in speech), shows how social alignment is produced and reproduced in student interactions and its relevance for solidarity (Roth & Tobin, 2010). The theoretical insight that entrainment provides is that it allows for an understanding of how emotional energy can be used to create solidarity. Roth and Tobin's (2010) study shows how interaction ritual theory can help to make sense of how entrainment through patterns of speech in micro-moments is relevant for how institutional structures are questioned and negotiated within

classroom contexts. This approach allows for making sense of how resources are linked up in interaction.

I argue the importance of going beyond speech within interaction rituals to make sense of how learners are bodily linked up and involved in interactions. Collins emphasis on bodily co-presence for interaction to take place requires an examination of how interlocutors' bodies are linked in interactive work. When actors collectively participate in a task through embodied modes such as gesture, arrangement of objects and multiple languages, they may accomplish group synchrony over time through the build-up of emotional energy (Wilmes & Siry, 2018).

## 2.6 Synthesis of Theoretical Perspectives

I will now articulate how I connect situated, participatory, embodied learning, resource-rich views, science discourse, and interaction rituals in my conceptual framework for this study. In my explanation of the framework, I rely on understandings of micro-, meso-, and macro-social structure to theorize the meanings of each piece of the framework. These levels have associated temporal understandings with them, at the micro-level, interactions are on the scale of seconds and minutes. On the meso-level the emergence of the learning context over time is revealed as social actors, the material space of the classroom, and the responsive curriculum play out in the space. The macro-level pertains to much longer lasting structures such as historical understandings. While the macro-level structure is most abstract, I take up Collins' (2004) approach that these historically understood discourses impact both the meso- and micro-levels, in the interest of the research here, I have included both the micro- and meso-levels in the complete conceptual frame diagram in Figure 2. The process of structuring on the micro-level provides justification for the use of interaction ritual theory to draw theoretical connections to the meso-level structure of the learning context.

Not only do interaction rituals provide theoretical grounds for generating understanding of interactions on the micro-level and meso-level, but they also provide the foundation for making sense of how participating in moments around laughter can build emotional energy in individual students and group solidarity—both important for youth's participation.

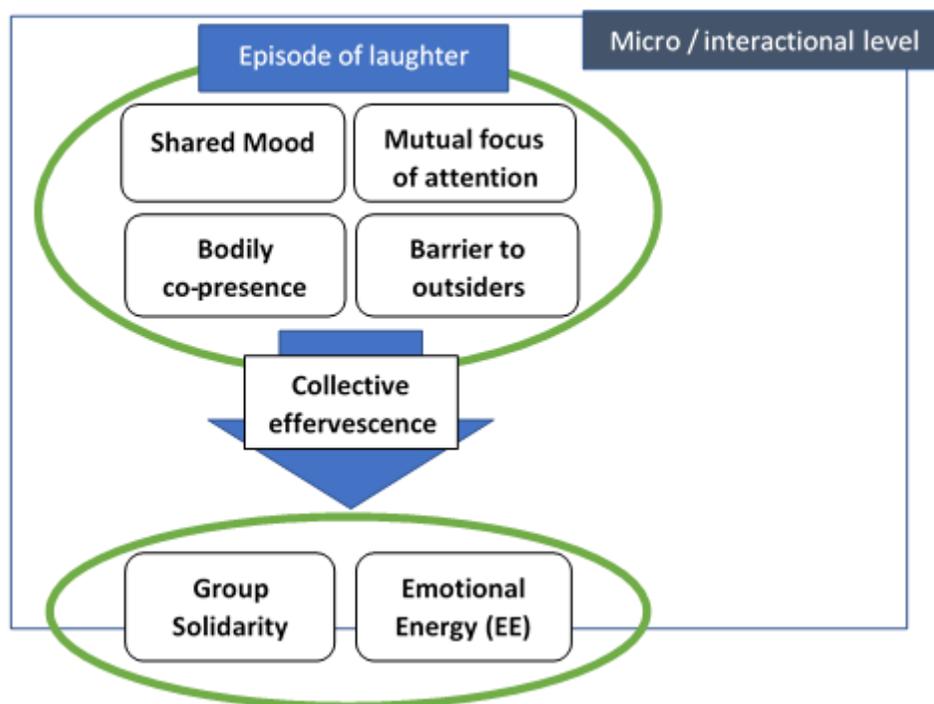


Figure 1: Interaction Rituals Around Laughter

As shown in Figure 1, I theorize episodes in the afterschool program happening around laughter to have the components of interaction rituals: they require bodily co-presence, a barrier to outsiders, a shared mood, and a mutual focus of attention. The ingredients build in contextually dependent ways to create a successful ritual (to some degree, for some party to the interaction) which produces collective effervescence. This collective effervescence is felt when the interaction ritual is positive. For all involved in the interaction, the ritual may provide varying degrees of emotional entrainment and may be successful or unsuccessful to varying degrees that the outcomes of group solidarity and emotional energy (EE) are achieved. Due to my interest in youth's embodied participation and the social factors that facilitate youth's involvement, I focus on group solidarity and emotional energy's meanings for youth's interactions, discarding the focus on carrying those meanings within symbols. For instance, positive feelings that some instances of laughing together generates can be seen as generating the necessary emotional energy to build and engage in further interactions. Laughter may also be implicated in instances where youth

experience interactions that are less positive and they do not get to share in the emotional energy and solidarity created, perhaps detracting from further participation.

The collective effervescence felt in a positive ritual is converted to lasting feelings of group solidarity and emotional energy (EE) for individuals such as that of feelings of confidence and enthusiasm (Collins, 2014). In a positive interaction ritual, through an increase in mutual focus and bodily entrainment, the shared emotions grow into feelings of group solidarity (Collins, 2014). This solidarity is achieved through a build-up of emotional energy (EE) that is done through being entrained to one another's emotions. Collins speaks of solidarity as feelings of belonging and identification with a group (Collins, 2004). Solidarity provides a lens through which to examine the outcomes of interaction rituals, drawing on emotional energy needed for individuals' further participation in the community of learners in the afterschool setting as shown in Figure 2.

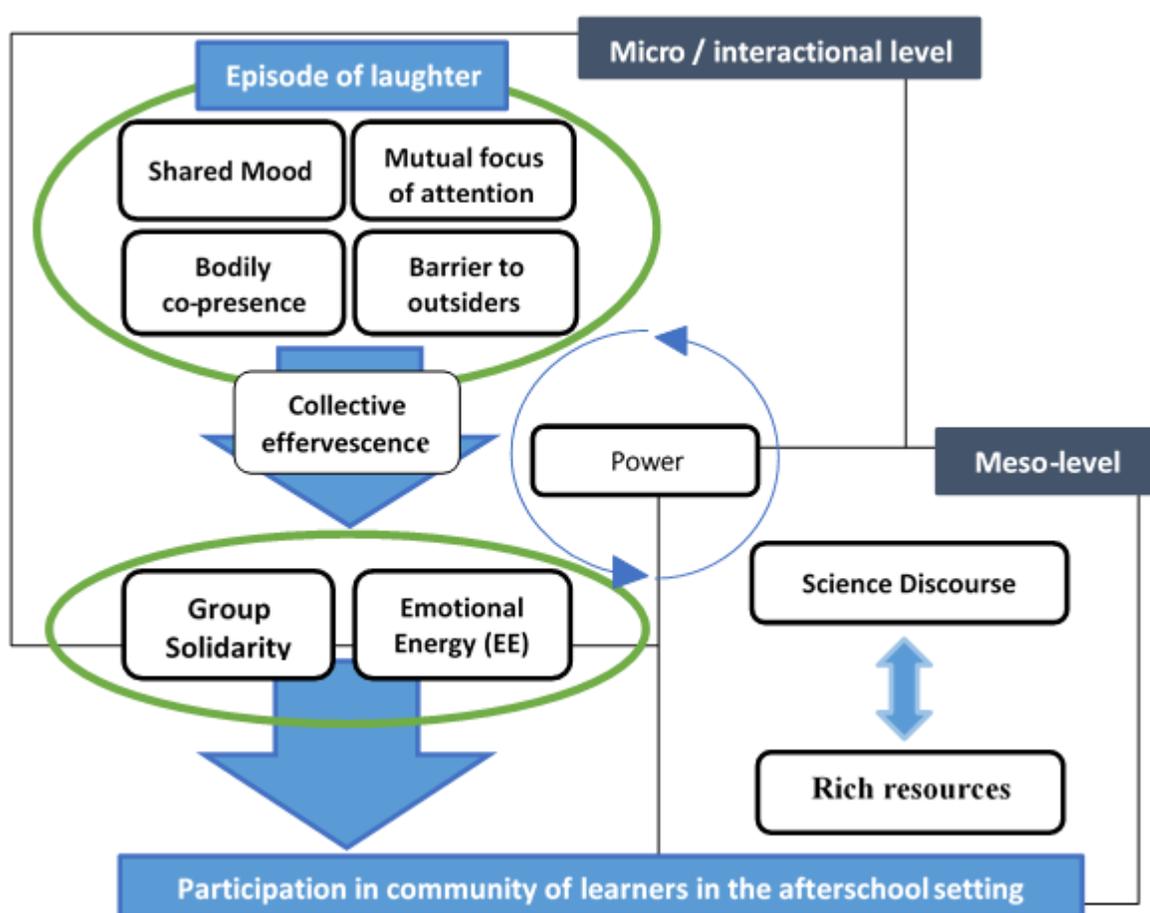


Figure 2: Conceptual Framework

I draw on the concepts of solidarity and emotional energy to make sense of how collective moments are linked up, providing a link between subsequent moments in the learning setting after the moment around laughter. This “chained” nature of interaction ritual theory, has significance for learning as a process “involving formation or changes in practices, ideas, social bonds, or sentiments, then we can also add that it is constituted through growing participation in group activities focused on any or all of these elements (i.e., feelings, ideas, and practices) of an interaction ritual” (Bellocchi, 2017, p. 100). It is through examining involvement in interaction rituals that researchers understand how participation is negotiated and the associated emotions and concepts that are part of the interaction. Thus, IR theory provides a view of learning science as the conjunction of embodiment, cognition, and emotion (Bellocchi, 2017).

In conjunction with the participatory, embodied lens I take on learning, interaction rituals offer a theoretical insight into how moments around laughter are implicated in learning. Collin’s concept of collective effervescence or entrainment shows laughter as a way to build the emotional energy in individuals needed for solidarity. Laughter is characterized as collectively produced and can build on itself, it can be prolonged via remarks or gestures which are not funny in themselves but in the context serve for the laugh to continue (Collins, 2004). This theorizing of laughter shows a collective and rhythmic entraining of people together in a micro-interactional ritual. Collins argues that being bodily absorbed in deeply synchronized social interaction is very pleasurable and thus laughter is often a positive interaction ritual (Collins, 2004). The interaction ritual perspective provides rationale for why instructors are recommended to be humorous and make students laugh (Lovorn, 2008). The collective effervescence generated through shared laughter offers a site for the production of solidarity that can be useful for sustaining relationships. Students engaging in teacher-invited laughter can signal understanding and reception of comedic parody (Roth et al., 2011). By taking up the teacher’s invitation to laugh, students invite a joking relationship with the teacher. On the student side, laughter can also provide a way for learners to negotiate and accrue EE that they may not be able to access through dominant means such as getting good grades or teacher praise (Olitsky, 2007). This negotiation points to issues of power and status inherent within classroom learning settings where teachers typically hold more emotional energy and have higher status than students (Bellocchi, 2017).

Researchers using interactional approaches to humor and laughter in science education point to the importance of incorporating an understanding of power relationships into interactional

studies of humor and laughter in science learning contexts (Berge, 2017; Roth et al. 2011). In working with marginalized learners, I further recognize the importance of addressing power and status within interaction by drawing a theoretical connection between the work that solidarity and emotional energy produced in moments of interaction around laughter. In Mikhail Bakhtin's (1984) examination of the French Renaissance writer Rabelais' work on medieval carnival deconstructed in *Rabelais and His World*, he put forth rhetorical analysis of Rabelais' depictions of the grotesque body in mediaeval culture. His analysis shows an embodied perspective on laughter, one which deals with serious things in an ambiguous manner, both breaking down and maintaining the institutional structure. From a Bakhtinian standpoint, laughter and jokes provide a window into the tension of power hierarchies and the dogmatic nature of what is deemed sensible or logical. Further, the interactional resource that laughter provides can be understood as being inherently historical and cultural, while being enacted through an individual, is also transcendent of that individual. This transcendence can be seen as linking group solidarity to power.

Interaction rituals take social phenomena to be emergent and contested on the micro-level (Collins 2004; Summers-Effler, 2002), thus while realizing that power is realized in meso and macro scales of social organization, at the micro, interactional level, power is the influence on others that a social actor has in an interaction (Kemper & Collins, 1990). There is status associated with this power such as that of a teacher as being positioned as having a higher epistemic position in relation to students. I recognize that power is implicit in negotiations (Collins, 2004), and the greater institutional structures at play come from the experiences that learners have drawn on in understanding what the structures are within the situations they participate in (Tobin, 2012). For example, the implicit rather than official understanding that a native English speaker in a learning setting with those learning English as a second or third language provides an unequal power dynamic due to the differences in linguistic resources available to the respective interlocutors (Davies, 2003).

The embodied practices through which learners negotiate their resources are important sites for the negotiation of science discourse (Elmesky, 2005). I frame laughter as an embodied semiotic resource for interaction and as a marker of interactions for the negotiation of science discourse. I read youth's interactions through a multimodal lens that provides a processual and embodied understanding of learning. Canonical interpretations of science discourse as English-centric and abstracted from everyday experience can be seen as exerting power from a historical space as

science discourse has historically been purported along a narrow set of guidelines. I understand science discourse as a meso level negotiation that youth take up by drawing on and creating space for their rich resources to be incorporated in the space. These negotiations are influenced by the power interlocutors have in interactions. I recognize that these understandings are also informed by more macro or lasting, historical understandings of what science discourse is and the resources youth bring to bear in interactions in the science learning setting.

In the theoretical review here, I have articulated a situated and participatory perspective on learning (Lave & Wenger, 1991). I am interested in the social bonds necessary for participation in the learning setting and the effects of these relationships on the structures of these spaces, drawing on a legitimate, peripheral understanding of youth's participation in the community of learners in the afterschool space provides the situated view needed for this aim. Laughing in the community is it is a way of legitimately peripherally participating in the community. In this study, I pursue understanding of what this participation does for youth's further participation in the setting.

I recognize that learners drawing on resources that may not be accepted in the culture of science are important for their negotiation of science discourse in the setting. In accordance with scholars who recognize that theories of learning must account for power and institutional structure, I acknowledge that a participatory framework of learning as accounted for by Lave & Wenger's (1991) communities of practice model may prevent an understanding of individuals beyond the community of practice in the learning setting (Hodkinson Biesta, & James, 2008). Therefore, I draw on a resource rich perspective of youth's contributions which recognizes that learning is embedded in the larger context of systems of power, or what is often referred to as institutional structure. In doing so, I recognize the process-nature of learning and support a view of learning as both embodied and as becoming. Laughter provides an avenue through which to access rich resources, and negotiate science discourse, just how this access was made is the work of the inquiry detailed here. From this theoretical grounding, I ask my research questions.

## 2.7 Research Questions

The research questions I pursue are to clarify the allowances of laughter for participation within the micro-moments I examine in the setting and to draw out the rich resources that are negotiated through those moments being hooked into the greater fabric of the informal learning context in which this work takes place.

- What do episodes of laughter in the afterschool setting afford for youth's participation in science learning?
- How do episodes of laughter afford youth to draw on their rich resources to negotiate science discourse in the after-school learning setting?

## CHAPTER 3. METHODOLOGY

### 3.1 Introduction

In this chapter, I provide the methodological approach I took in analyzing video data collected from the setting. In accordance with the theoretical grounding of embodied, participatory learning, interaction rituals, and laughter as an embodied, educative process, I explicate my approach to an interactional analysis, which draws on methods of conversation analysis and multimodal interactional analysis to examine moments situated around laughter. I then explain how I make use of interaction ritual theory to link these moments to other moments in the learning setting. These analyses are used to understand how youth negotiate their resources in the setting and macro-level understandings of science discourse. I begin by providing a description of the afterschool learning setting and my positionality as a researcher-facilitator.

### 3.2 Multilingual Afterschool STEM Learning Setting

To investigate youth's participation through laughter, I examined video data collected from an afterschool STEM program titled Project RESET: Refugee Youth Engaging in Critical STEM Literacy and Learning. Project RESET engaged resettled Burmese high school youth in STEM learning during the 2016-2017 school year. Learners were sophomores and juniors in high school during the time they participated in the program. The youth were from varying ethnic groups in Burma but were mainly from the Chin State and spoke a range of languages including Hakha, Falam, Burmese, Zophei, and various other languages according to the ethnic groups they came from in Burma/Myanmar and thus were considered multilingual learners. In addition to their first language(s), learners had varying levels of English language proficiency. They also had varying lengths of stay in the United States and migration paths that lead through countries such as India and Malaysia before youth arrived in their city of asylum. Accordingly, youth had a broad range of experiences unique to their refugee status.

Curriculum in this setting was focused on connections between weather, climate, and climate change in conjunction with people's lives. A responsive teaching pedagogy was followed in implementing the program (Hammer, Goldberg & Fargason, 2012). This approach focuses on

drawing out youth's contributions and resources to allow them to pursue their interests within the framework of the curriculum. The program met weekly for 90-minute sessions in a history classroom in one of the two high schools in the area where students attended during the day. The program was held over the course of 22 sessions during the 2016-2017 school year.

Students engaged in various inquiry activities such as experimentation and online research, along with whole-group and small group discussions. Youth also engaged in creating PowerPoint and poster presentations to give to the group. Data examined in this paper mainly come from video recordings collected weekly over the course of 22 sessions and are supplemented by ethnographic data such as interviews and field notes collected over the course of the program. In examining interaction rituals around laughter, we drew on a micro-ethnographic understanding of the learning setting and examined micro-moments through multimodal interactional and conversation analysis.

### 3.3 Positionality

This project came from a concerted effort on my part to make sense of what laughter has to do with science learning in the afterschool space. I began working on Project RESET during my first year of graduate school. That year, the team was in the process of collecting video data, and I traveled to the research site each week to help facilitate the afterschool program. Being involved in this project presented a lot of first experiences for me. I had not worked with high school age youth previously to working in the afterschool program, nor had I worked extensively with racial-ethnic or linguistic minority youth. Further, I had not interacted with refugee learners. When I first came to the afterschool program, I was overwhelmed by all this unfamiliarity. At the time, I was also learning how to collect video data and how to do multimodal discourse analysis of interactions in the setting. When I went to the setting and viewed video of the setting, I was struck by how different this space was from any science learning space I had experienced before: there was laughter, students talked freely, they spoke in a range of languages, they used the space as they saw fit, they seemed engaged in what they were learning and pursued ideas they had. I began to wonder what could be understood about how learners changed through laughter, how does one even go about looking at laughter? What does participation in laughter do for youth's learning? This wondering became the foundation for the work detailed here. I learned conversation analysis as a way of making sense of laughter, yet struggled with its ideological foundation that did not address power and science discourse or help me to make sense of learning. This conflict led me to

a partnering of this method with a sociolinguistic, multimodal interpretation and interaction ritual theory. The conceptual frame in Chapter 2 is the culmination of several years' worth of work on shifting my perspective on science learning and learning about embodied ways of knowing.

Given the openly ideological stance I take in my work, I would like to acknowledge the positionality of an American-born, white, middle-class, English-monolingual, woman from which I do my work. This is a position of privilege, and with my limited experience with refugee learners, may provide some blind spots in my work. I recognize that the claims made within this study are entangled with my positionality. I have struggled throughout this process with the idea of representing the youth in this study and I hope my readings of their laughter offer a way to shift deficit narratives of refugee youth.

### 3.4 Interactional Sociolinguistic Conversation Analysis

Lave & Wenger's (1991) situated understanding of learning shows that learning is not separable from the context in which it takes place and that individuals are part of what creates said context, therefore learning must be studied by complete examination of context. In taking up a view of learning through interaction and participation in the practices of a science learning setting, I posit that learning can be observed in interaction (Jordan & Henderson, 1995). I used an interactional understanding of learning to make sense of how individuals are changed through participating in social situations. In doing so, I recognize that participating in social interaction with those in the after-school setting is engaging in practices that offer youth the opportunity to negotiate the practices of a science learning setting. In taking an interactional approach to analysis, I draw on interactional sociolinguistic interpretations of conversation analysis.

Within area of interactional sociolinguistics there is a burgeoning field of studies focused on laughter specifically. This area works from the ethnomethodological standpoint forwarded by Garfinkel (1967) as well as the conversation analytic work forwarded by Harvey Sacks, Emanuel Schegloff, and Gail Jefferson (1974). The tradition forwarded by these schools of examined how social action is coordinated in interaction, and, thus, how social life comes into being through said interaction (Glenn & Susskind, 2010). The conversation analytic approach utilizes the transcript notations pioneered by Gail Jefferson (i.e., Jefferson, 1984; Jefferson, 2004;) and provides analysis of how social life comes into being at the turn-by-turn level in interaction. Analysts look closely at actions such as the increase in pitch placed at the end of a turn (in English), which may convey

a question to the hearer. The hearer may pick up the speaker's turn as a question and respond in turn, or may interpret it differently. In doing so, the social intent of the action and how it is received by the hearer based on the next action in the interaction and within this interaction meaning is created. Interactional sociolinguistics theorizes language within the social and cultural the context in which the interaction takes place. An interactional theorizing also assumes that interlocuters are constantly in a process of generating understandings through negotiation that rests on shared understandings of the context in which they are interacting. The shared understandings and context provide the frame from which interpretations are drawn. I argue that a social interactional interpretation of conversation and particularly, laughter (Glenn, 2003), is justified and especially necessary for analyzing laughter in science learning. This methodology offers an interactional approach to laughs as embedded in the context of the learning setting.

In taking laughter to be linked up as part of social interaction, I see laughter to be an indexical aspect of communication (Glenn, 2003; Glenn & Holt, 2013) In interaction, interlocuters see laughter as having a referent, or pointing to something that is laughable. As such, laughter is jointly negotiated in interaction where one interlocutor may offer a turn as potentially laughable, and that turn make be taken up by others as laughable. This interactional approach offers a delineation between approaches to laughter that minimize its value for its physiological aspects or as a response to a stimulus (Provine, 1992). Instead of taking up a line of questioning as to *why* we laugh, the frame is shifted to what social work is being done *when* people laugh (Glenn, 2003).

In taking an interactional understanding of learning (Jordan & Henderson, 1995), I also take up an understanding of laughter as interactional (Glenn, 2003). Taking laughter to be interactional recognizes it is socially produced and has specific social intention associated with it (Glenn, 2003). A conversation analysis approach guides to examine language closely, attending to the stress interlocuters place on syllables, pauses, and pitch, allowing for the nature of laughs to be examined closely (Glenn, 2003). Without this close analysis of laughter, a problematic situation could arise in which one cannot decipher different types of laughs or communicate with others what that laugh means. As in the case of describing a laugh as a "chuckle," this can mean various things to different people. In closely transcribing a laugh, one can show why one might describe the laugh as a chuckle and how it is taken up in interaction with others.

My approach to conversation analysis is multimodal. Laughter is a unique form of communication as it is a mode which aggregates vocal and non-vocal modes by encompassing

modes of volume, aspiration, smiling, body torque, leaning the body backward and forward, and covering one's face with hands (Ikeda & Bysouth, 2013). These modes run over one another in laughter just as laughter runs throughout speech. Any attempt to separate these modes is for analytic purposes only. Without attending to different aspects of laughter, one cannot learn its referent or what it does for the setting. Taking a multimodal view allows me to view laughter as composed of multiple modes—whether it be bubbling over speech (Ford & Fox, 2013), smiling (Haakana, 2010), leaning the body back and forward or covering the face with the hands (Ford & Fox, 2011). This approach to laughter is in accordance with the understanding that meaning is made by the aggregation of many modes at once and embodied (Goodwin, 2000). In interaction, interlocutors work constantly to get the attention of the listeners and communicate and make meaning within their bodies in the social context (Goodwin, 2000). Further, taking a multimodal approach to youth's interactions has been advocated by scholars working in multilingual science learning settings as a way to value the resources multilingual youth bring to those settings (Wilmes & Siry, 2018), and to recognize that disciplinary learning spans many modes beyond language (Grapin, 2019). It has also been called for in those examining interactions around laughter with language learners (Liang, 2015). The very act of looking at the importance of the mode of laughter is part of valuing the interactional resources multilingual youth draw on in the setting.

From an analytic perspective, conversation analysis allows me to see how laughter is picked up by interlocutors in interaction and affords youth's participation. Within the literature that addresses the meanings of laughter in interaction, taking a bodily approach to laughter has recently been utilized as a way to interpret how bodily modes can contribute to making something laughable (Ford & Fox, 2013). A laughable in a multimodal frame is understood as “a turn (or part of a turn) must be produced with possibly laugh-relevant sounds and/or bodily displays, and it must be responded to with laugh relevant sounds or bodily displays” (Ford & Fox, 2013, p. 340). What makes something that could become laughable are things like exaggerated performance, irony, incongruity, word play, joke telling, comedy, and previous shared laughs (Glenn & Holt, 2013).

In taking on this approach, I align with Cecilia Ford (2012) in utilizing conversation analytic methods to study laughter in science learning. Those working in the conversation analytic tradition are reluctant to utilize a priori categories (Jefferson, 2004; Ford, 2012), such as the categories and historical understandings taken up in a cultural view of learning that I have explicated here. Their

reasons for this approach are valid as they are reluctant to impose socially constructed categories in analysis. This presents a limitation to my uptake of this methodology as it diverges from its empirical and ethnomethodological roots. The tension I hold with the conversation analytic tradition is that as researchers we hold our own cultural reflections on how social action works that are arguably impossible to extricate from an interpretive analysis. It could be read as a limitation that I draw on my understandings of categories such as those presented in gender, or what it is to be a refugee as my understandings are inherently limited by my relational positioning to those categories. This limitation is necessary as I draw on conversation analysis CA to make sense of laughter in interaction and use these analyses with interaction ritual theory. CA does useful work in attending to how social life plays out in the moment and is mutually constructed by those involved in the interaction (Ford, 2012). My purpose is to make sense of the workings of laughter as linked to learning, and as such my understanding of laughter must take up a historical and cultural bent I use in understanding learning. Therefore, I take up with studies that appreciate the micro-level interactional analysis provides a view into the meso-level of the learning context (Ford & Fox, 2013). I draw on the rich tools and understandings of conversation analysis combined with a multimodal interactional frame to address how power and resources are taken up and used.

Glenn (2003) draws on the work of Mikhail Bakhtin (1984) to address the significance of laughter for this aim, noting that Bakhtin saw laughter to be “a means to challenge the social order by making objects of derision out of those in power and the rituals and rules that maintain those power relationships” (as quoted in Glenn 2003, p. 31). In this way, laughter is a way to redistribute and negotiate power. Analysis can then show how group membership is negotiated (Liebscher & Dailey-O’Cain, 2013), and overall how the learning context emerges over time.

### 3.5 Micro-ethnography

I align with previous studies on laughter in science education which trade an interest in the order of conversation for an interest in the context in which the laughter takes place (Berge, 2017; Roth 2011). To make sense of the interactional contexts examined in this paper and link those meanings up with subsequent and previous interactions, I viewed the learning setting through a micro-ethnographic lens (Erickson, 1996). Thus, I used video-audio data, interviews, field notes and bound them by the afterschool setting (Erickson, 1996). This approach allows for an understanding of the discourse as rooted in the context and provides a way for me as a researcher

to draw on my experiences in the learning setting. Micro-ethnography is noted for its ability to expose “systems of power and control (and resistance to them) that are grounded in the realities of people’s everyday lives, the ways or possibilities through which people create meaningful lives and caring relationships for themselves and others” (Bloome, Caster, Christian, Otto, and Shuart-Faris, 2004, p. 56; Garcez, 2008).

### 3.6 Interaction Ritual Theory

In drawing on micro-ethnographic understandings of the setting, I link to interaction ritual theory. IR offers a way to make of how moments of laughter are integrated as part of the lived curriculum—what actually happens within the context of the intended curriculum (Bellocchi, 2017). I make use of the theoretical understandings of emotional energy (EE) and entrainment from interaction ritual theory to make connections to other moments in the setting for the understanding of how these micro-moments are linked into the context of the learning setting and how they are involved in producing solidarity. Interaction rituals offer a way of looking at how both the embodied modes and verbal modes are part of interaction (Wilmes & Siry, 2018). As I take up an embodied, situated concept of learning, analysis of bodily modes of interaction and especially of laughter are part of my analysis. In doing so, I read how youth generate awareness of one another’s focus and emotional orientation to read how interactions may be successful and whether solidarity and emotional energy – which are both important for creating feelings of empowerment, confidence, and initiative toward action” (Elmesky, 2015, p. 101). Elmesky (2015) provides the argument looking empirically at micro-moments collected through video analysis techniques, IR theory offers a way to (1) identify general patterns of engagement in interactions, (2) identify where mutual focus placed by the group, (3) empirically examine how both the physical and emotional entrainment in movement and coordinated expression of emotion. These empirical analyses provide inferential material for the workings of solidarity and emotional energy.

Work done in combined content and language learning settings provides precedence for combination of IR theory and microlevel conversation analysis. A study that combined the meso-level understanding of the classroom through Wenger’s communities of practice model and the micro-level conversation analysis approach in a Content and Language Integrated Learning (CLIL) course integrating English language and biology instruction in Spain shows that a multimodal approach to examination of interaction is useful for understanding how mutual focus and joint

participation are produced via learning in moment (Evnitskaya & Morton, 2011). Their analysis showed how micro-level aspects of interaction such as gaze and gesture are important for generating a joint enterprise in the local community of the classroom situated within the wider disciplinary community of which the science classroom is part (Evnitskaya & Morton, 2011). For language learners a situated practice approach and micro-level conversation analysis provide a way to shift the focus from communicative competence being about being a production of the instruction to valuing the competencies that students already have in learning content and language (Evnitskaya & Morton, 2011). Further work using interaction ritual theory in urban science classrooms supports its importance for focusing on group solidarity and cohesion both between students and in student-teacher interactions (Elmesky, 2015). I see an IR approach as aligned with my interest in drawing from the micro-level interaction to the meso-level taken up by interaction ritual theory and situated understanding of learning.

### 3.7 Methods

#### 3.7.1 Micro-ethnographic “Zooming In”

Due to the micro-ethnographic approach in this analysis and the use of micro analysis, I have provided ethnographic contexts for each of the episodes analyzed in this study. I followed a process of zooming in and zooming out to analyze each episode and fit it within the emergent context of the afterschool setting (Elmesky, 2015). Providing the prior ethnographic context offers a way to recognize the social action that has led up to the moment of laughter and its temporal location in the events that occurred in the afterschool program. To frame each moment, I provide a description of its situation within the entire afterschool program and within the day’s session. In doing so, I weave together analysis with description of how the situations unfolded in the setting (Elmesky, 2015). The understandings generated through micro-ethnographic data and my experience as a researcher-facilitator in the setting provide an understanding how each moment is framed. Before I did the descriptive work of zooming in, I selected the episodes for analysis.

#### 3.7.2 Episode Selection

I selected episodes on the basis of the presence of laughter, as I wanted to make sense of the affordances of laughter in multiparty interactions within the science learning context. The episodes detailed in my analysis focus on laughter between groups of two or more learners in

interaction with a facilitator. The presence of a facilitator was partially due to the data collection methods followed in the space where the microphone synced to the camera video data was worn by the facilitator. Additionally, episode selection was based off of utterances in conjunction with laughter as selecting for laughter alone within the video data corpus proved difficult based on the amount of noise generated in the discussion and inquiry based science learning environment. I selected each episode on the basis of laughter and the presence of some sort of joke. Joking environments provide a laughter-filled atmosphere for analysis, yet do not always include laughter that is in referent to the joke. Once a joking moment was identified in the data, I bracketed the episode around the joke documenting the interaction leading up to the episode and the conclusion of the jokes examined. To aggregate episodes of laughter, I searched content logs and preliminary analysis documents, a total of 11 episodes of laughter were identified for potential analysis. I detail the investigation of three episodes within this study.

It should be noted that the moments selected for close analysis were not selected on the basis of being identified as disciplinary talk, as this approach would impose my concepts of what qualifies as science disciplinary work on the data. Rather, I understand each of these moments as participation in the setting and hooked into the fabric of science learning as a process and investigate them as such. Once each moment was identified, I constructed multimodal conversation analytic transcripts.

### 3.7.3 Transcript Construction

Construction of transcripts followed an adaption of transcription conventions from the community of researchers focusing on laughter in interaction (Ford & Fox, 2013n; Glenn, 2003). Researchers working in this area draw from transcription conventions originated by Gail Jefferson (Jefferson, 1985). My adaptation of the transcript conventions can be found in the **List of Symbols** and derives from the conventions from Glenn, (2003), Ford and Fox, (2013), and Jefferson (1984). These conventions have been combined with multimodal transcription informed by the school of multimodal interactional analysis rooted in Kress's work in science learning settings (Kress, Jewitt, Ogborn, & Tsatsarelis, 2014). The purpose of adapting several frames of transcription notation is to recognize the utility of certain conventions while creating or adjusting others to interpret and make sense of data. I make use of conversation analytic notation to look closely at the production

of laughables and how these laughables are responded to and picked up by others participating in the interaction.

Videos were watched iteratively while constructing conversation analytic transcripts. Episodes were also watched with the sound turned off to allow for greater focus on nonverbal modes (Wilmes, Fernandez, Gorges, & Siry, 2018). Play back speeds were slowed to allow for greater analysis of bodily movements (Elmesky, 2015; Wilmes, Fernandez, Gorges, & Siry, 2018). In the episodes detailed here, I constructed each turn using the audible and non-audible features involved in an interlocuter making a contribution to an ongoing conversation. As it would be impossible and theoretically unfaithful to attempt to transcribe every single modality in each turn, I decided which aspects were salient in the construction of each turn via the audible and associated non-audible aspects of the turn. The most extended version of a turn is shown in Table 1.

Table 1: Transcript of an Example Turn

- 4 MT: What do you think will happen?  
 4a ((MT: *turned toward E, gazing at him*))  
 4b ((E: *leans forward to MT while smiling open-mouthed with eyebrows raised*))



As can be seen in the transcript in Table 1, the audible aspects of the turn are transcribed in the line notated with the number. In the above excerpt, the first turn occurs in turn 4 of the episode being analyzed. This is the fourth audible change in interlocuter turn within the sequence of turns taken by the interlocuters within the episode. MT, who is seated in the middle of the triad in this episode, is the speaker of this audible part of the turn. If audible aspects of laughter were heard in this utterance they would be included on this line. The underline in on the audible portion of the transcript indicates the non-audible modes notated in 4a and 4b coinciding with the utterance in

turn 4. Line 4a indicates the non-audible modes belonging to the speaker of the utterance. As an exhaustive account of gaze, gesture, proxemics, etc., would make the transcript cumbersome both for the reader and for us as researchers, the modes noted are provided where they were analytically useful. The annotation in line 4b are the non-audible resources employed by E, the boy sitting to the left of MT. N, who is the other youth in this interaction, does not have her non-audible modes annotated because it was not analytically useful to include them as they are noted in the next turn. Below the non-audible aspects of the transcript may also appear a video still captured from the to illustrate bodily movements and other such aspects of the transcript. The photo is aligned underneath the non-audible annotation it illustrates. Additionally, I have added arrows to indicate bodily movement and gestures. Taken together, 4, 4a, 4b, and the screen capture all are grouped to makeup the fourth turn in the interaction which belongs to MT. For readability's sake, transcripts can be found in the Appendix of this document.

To transcribe laughter, I identified and transcribed to the best of my ability, individual laughter particles such as “heh” and “hah” within an interlocutor’s utterance and also bracketed to indicate overlap between interlocutors in laughter. I also indicated laughter within speech by indicating a smile voice (for example, utterances surrounded by £, such as in “£yes£”) as part of laughter (Ford & Fox, 2013). A smile voice is identifiable when listening to the constriction of utterances produced by the mouth smiling during speech and was indicated in the transcript using conventions such as Ford and Fox (2013). Additionally, transcription of “h” within a word indicates laughing as well as it is representative of exhalations within the utterance (Jacknick, 2013). Transcriptions of audible aspects of laughter were accompanied by transcription of bodily movement such as pushing one’s body away from a table or closing of eyes while laughing. These aspects of the transcript helped me to make sense of laughter as an embodied mode and to analyze learning in interaction within the learning environment.

### 3.7.4 Episode Analysis and Zooming Out

After each transcript, I wrote a turn-by-turn analysis of the interactions. After each micro-analysis I provide a description of how the moment is then connected with other moments within the session and over the course of the program as informed by the micro-ethnographic lens. This approach of zooming into the interactions examined and zooming back out to make sense of the

significance of those moments in the afterschool setting provides an understanding of how the learning setting becomes a learning context and how that context is influenced by the greater sociocultural context (Elmesky, 2015). This approach is aligned with the situated understanding of learning that takes context to be both the setting and the persons engaged in interaction in the setting (Bellocchi, 2017). I further connect these moments using Interaction Ritual Theory, explicating how interaction in episodes of laughter can create emotional energy (EE) and group solidarity and investigate their implications for participation in the science learning setting.

### 3.8 Conclusion

In this section, I have provided an account of the methodological theory of laughter I take up in my inquiry. I draw on sociolinguistic interactional interpretations of laughter to analyze laughter using a conversation analytic framework informed by multimodal interactional analysis. These analyses are coupled with Interaction Ritual Theory analysis to provide understandings of the affordances of laughter for participation, and thus for learning.

## CHAPTER 4. FINDINGS

### 4.1 Introduction

In this chapter, I use the methods explicated in the previous chapter for the purpose of examining three micro-interactions selected from the video data collected from the afterschool STEM learning setting. I then draw on interaction ritual chains to make sense of how youth negotiate their resources and science discourse.

### 4.2 Episode 1: “We will have barbeque”

#### 4.2.1 Situating within the Micro-ethnographic Context

In this episode, participants were attending the 17<sup>th</sup> session of the program. That day, youth were asked to make a prediction about what would happen in selected locations around the world with continued climate change. Youth worked in pairs, which were not self-selected, rather the instructor requested that participants partner with someone they did not know. Youth were then asked to research and construct predictions that they would present in a poster session format at the end of the session.

The participants in this interaction were Efraim (abbreviated as “E”) and Nwe (abbreviated as “N”). They had selected the city of Indianapolis, Indiana as the city about which they would make their prediction. Efraim is both new to afterschool setting and to the United States context. Efraim speaks Falam and feels he does not speak English well. He has been in the United States for a little over a year. Nwe is a native speaker of Hakha and has been in the United States for four years. In an interview she participated in when attending the sessions, she reported an intermediate English proficiency. The participants do not share a common language in which they are both comfortable conversing, but they have some understanding of one another’s home language. Language use was negotiated earlier in the lesson in which Nwe and Efraim were asked by a facilitator (MR) whether they spoke the same home language and decided they would be able to communicate. Previously in the session, they spoke to each other in their respective home languages with some clarifications required. In this episode, they speak in English to communicate with MT, a facilitator with whom their shared language is English.

When the following interaction occurs, Efraim and Nwe have been working on making their poster and interpreting climate change data. The following interaction occurs as one of the facilitators, MT approaches the group to inquire about their predictions for what will happen in Indianapolis in 100 years. When MT approaches the group and asks how their work is going, Nwe responds, “Pretty bad I guess.” Nwe and Efraim have just spent some time trying to interpret a graph related to emissions projections for Indianapolis with one of the other facilitators. Nwe is uncertain about the meaning of the word emission. Just before MT approaches, Efraim has explained his understanding of the graph to her in his home language, Falam. Nwe does not speak Falam, but speaks Hakha. The two languages share some similarity, but Nwe still seems confused after Efraim explains. After Nwe has expressed that things are going badly, MT takes some time to explain about how carbon dioxide emissions result in higher temperatures. She asks about what some of the effects they think that climate change will have on the way people live and the annual weather patterns. MT asks many questions and draws out Nwe’s ideas. During this conversation Efraim has remained quiet while leaning in toward MT and Nwe, showing his attention to their discussion. The episode starts as MT turns to Efraim and invites his input.

#### 4.2.2 Turn-by-Turn Analysis

Please refer to Table 2: Transcript for “We will have barbeque” in the Appendix for the conversation analytic transcript. In turn 1 MT insight’s Efraim’s participation by asking him what he thinks and using his name to do so. When she says his name, she gazes at him and touches his arm, this functions to draw him into the interaction at hand and specifically requests him to share his ideas (Turn 1a). In response, Efraim laughs a two-beat closed-mouth laugh. He then leans back, puts his hand on his chin, then puts his hands in his pockets (Turn 2, 2a). Taken together, Efraim’s closed-mouth laugh and the “thinking” stance he takes by placing his hand on his chin can be seen as a bid to be excused from answering the question verbally. This pantomime of “thinking” (Images in Turn 2a) along with nervous laughter are offered as a substitute for supplying his ideas verbally, showing his reluctance to share his ideas. Instead of taking up this as a joke and allowing Efraim to avoid participating in sharing his thoughts with her, MT inquires again what he thinks, specifying her question to inquire about his thoughts on the animals (Turn 3). As she does this, Efraim responds by leaning back in toward her with his mouth slightly ajar, following her questioning and remaining attentive to her questions (Turn 3a). MT repeats her inquiry (Turn 4)

while orienting her body and gaze toward Efraim who continues to lean toward MT and raises his eyebrows and smiles at MT with an open-mouth, which can be seen as a stance of being unsure and surprised by her further inquiry (Turn 4a). The style of questioning that MT is taking up diverges from the often-practiced IRE (Invitation-response-evaluation) style of questioning typically present in classroom spaces, instead asking him to blend his own ideas with that of science discourse (Lemke, 1990). MT is inviting what Efraim predicts will happen to animals with continued climate change and the resultant rising temperatures. MT's repeated inquiry to Efraim invites a verbal response by him, providing a space in the interaction for him to contribute his thoughts and pushes him to think specifically about the animals.

In his next turn, Efraim takes up MT's line of questioning offering the idea that the animals will die. The rise in intonation at the end of his response gives it a quality of a question (Turn 5). As Efraim gives his response, he looks down then looks up at MT and smiles as he says "die?" (Turn 5a). This answer phrased as a question shows the uncertainty in his answer. Taking up this line of thought, MT repeats his answer with a low fall intonation on "die" (Turn 6), offering it as a declarative statement rather than a question, yet still raising her eyebrows to construct her utterance as a question in need of verification, inviting Efraim to clarify his explanation. Efraim affirms her statement, but hedges his answer further at a marked lower volume than his previous utterance, nodding as he says "I think" (Turn 5,5a).

MT responds by saying they will have barbeque, extending the last syllable before pausing and turning to grin at Nwe, grinning with her teeth as part of the beginning of a laugh (Turn 8a). MT's delivery of "barbeque" and turning to Nwe function to draw Nwe into the discussion, and for her to evaluate the statement MT has just made. Nwe is looking down into her lap with her long hair partially covering her face. She laughs a particle with her mouth closed and is joined by Efraim in the midst of her second particle of laughter. The audible portion of her laugh is coordinated with her bodily movements of her shoulders shaking, pushing her hair out of her face, and grinning (Turn 9a). Efraim's laugh, which begins in the middle of Nwe's second laugh particle is at a notably higher volume and plays across his body as he leans forward toward Nwe then back with his face in an open-mouthed smile and his eyes squinted shut (Turn 10,10a)—when MT's previous utterance is viewed as the referent of his laugh. It can be argued that her suggestion is received as a joke (Sacks, 1974). Efraim and Nwe's overlapping laughter can be seen as laughing *with* one another. Their laughter can be seen as a way to test whether MT's remark constitutes a

joke, providing a space for MT to assert her position as a facilitator by asking why they are laughing or countering her statement as serious, instead she smiles and draws out the word barbeque which is negotiated by the three of them as a joke.

This joint engagement in laughter functions to break down what Nwe had previously supposed as the structure of the task which was to provide a “right answer” to the question. The regime of school science can then be seen operating in this moment, as school science typically is oriented toward addressing the accepted scientific answer (Lemke, 1990; Warren et al, 2001). They may be drawing on this school science discourse as they are doing a science prediction and school science often has activities in which students are asked to give a single right answer or provide a pre-determined hypothesis. MT’s utterance in Turn 8 also acknowledges Efraim’s contribution in a way that introduces an incongruity to what is presently being discussed. The incongruity is presented by the ridiculous nature of having a barbeque of animals that have died because of climate change, yet she is still modelling making a prediction in response to Efraim’s uncertainty. Thus, the joke she contributes can be seen as opening the door for Efraim and Nwe to reframe the way in which they are pursuing the question and marking Efraim’s uncertainty as an acceptable aspect of the nature of the task at hand. The laughter in response to her joke (Turn 8) functions as a democratizing moment in which MT focuses on how they need to make predictions that *they* come up with rather than relying on authoritative resources which cannot provide a single correct answer to the open-ended question posed in this session (Turn 12), emphasizing the predictive nature of the task to Efraim by directing her gaze at him (Turn 12a). This modeling of the uncertainty in making predictions as acceptable is echoed by Nwe’s conclusion that a prediction means that there is no right or wrong answer to the task (Turn 15). MT affirms her question (Turn 16, 18)—reiterating that the task is about inviting what *they* think.

After this moment, Nwe and Efraim go about creating their poster by drawing in temperature and emissions predictions graphs they were investigating during their online research. They focus on creating a poster that shows their predictions, making causal connections between the climate change data they have been looking at and how that will affect plants, animals, and people. This refinement of their expectations of the task through laughter offers a space to recognize how the science task is uncertain, but that does not necessarily mean they are going about it incorrectly. Later in the poster making process, Nwe suggests that Efraim draws an animal dying and they share more laughter about him drawing a cow. He then draws the cow on its back

with its legs sticking up in the air, in which Efraim illustrated what his interpretation of a dead animal.

#### 4.2.3 Interaction Rituals and Affordances of Laughter

This interaction was part of an ongoing effort by Nwe and Efraim to verify that the task was not about finding a single “right” answer, but to come to an answer that makes sense to them given their research. The laughter they share here is part of increasing their comfort with there being uncertainty in their prediction as they create their poster. In the context of this session, the bodily entrainment through laughter (Turns, 9a, 10a, 10b, and 11a) provides Efraim and Nwe with the emotional energy to shift their perceptions of the prediction task. In linking up their bodies through laughter the emotional energy created and sustained in their subsequent interactions draws them into further participation. They see themselves as having a contribution to make rather than just copying directly from their internet search. It should be noted that this is the first time Nwe and Efraim have worked together, and emotional energy is useful for them to generate feelings of belonging in the science learning setting and with one another. By participating in laughter about how to illustrate dying animals, they are both drawing on and contributing to the EE accrued as part of the positive IR detailed here. Through the emotional entrainment generated laughter and the resulting EE, Efraim and Nwe create their representation, revealing the creative process of imagining the real, lived outcomes of their predictions.

### 4.3 Episode 2: “Let’s pray first”

#### 4.3.1 Situating within the Micro-ethnographic Context

This episode is drawn from the tenth week of the program. During the previous week, youth had discussed the meaning of climate and the associated weather patterns. The session examined here was notably not as well attended as previous weeks, with five youth in attendance (compared to a number of X in past weeks): Joshua (J), Kevin (K), Nyunt (N), Rosie (R), and Mon (M). These youth were fairly consistent attendants of the program in the first semester. Joshua and Kevin worked together frequently during the program as did Nyunt and Rosie.

As the program begins, youth are seated in a horseshoe shape set up of desks with MR sitting in the middle facing them. The three boys, Kevin, Joshua, and Mon sit next to each other across the group from Nyunt and Rosie. Shen, an undergraduate facilitator sits between them, but

he remains quiet throughout this interaction. This episode occurs early in the session as MR is about to call the group to attention to being the day's lesson. There is much talk and laughter as the youth chat with one another before the session starts. To begin the session, MR draws the group together with a loud "Umm" which is a method she uses to get the groups attention during other sessions. As she does so, Rosie finishes a beat of laughter from before the discussion starts. Joshua quickly inserts the suggestion that they should pray first. Joshua's request inserts a change in the normal progression of each session in which MR usually introduces what they will be doing by suggesting his own idea for what to do. Kevin, who is sitting to Joshua's left repeats the request to pray with a serious expression. MR is uncertain as to the meaning of their request and as the moment begins, she asks if one of them wants to lead the prayer.

#### 4.3.1 Turn-by-Turn Analysis

Please refer to Table 3: Transcript for "Let's pray first" in the Appendix for the conversation analytic transcript. At this point in the interaction, MR, could shut down this request as she has now affirmed that they are requesting to pray in a space where they usually do not pray. K's affirmation of MR's interpretation offers the opportunity for MR to use her power to direct the class as she is no longer looking for answers as to what is going on. In Turn 1 her gaze is once more fixed on J and she asks him if he wants to "lead the pray" (Turn 1). By taking up their request, MR plays into their joke, serving to build it further. In response, J laughs through his shaking shoulders and a wide grin, stammering a "no" with a smile voice and drawing his arm in front of his face to cover his laugh (Turn 2, 2a). MR, in a request for clarification, repeats his "no" (Turn 3) as she gazes at J (3a). As she utters this, K further contributes that J is doing to become a pastor (Turn 4), as he does so, he makes use of a level pitch and a pause in his delivery to build the joke further by making it more specific and presenting the opportunity for J to lead the prayer. If he were to do so, J would be facilitating the opening of the session, taking up the facilitator role that MR occupies. K also turns toward J as he delivers this utterance, drawing J into the joke further and playing with the idea of him being a pastor (Turn 5a). As he delivers this line, R puts her head down on the desk in what may be seen as her attempting to cover a laugh which may add to the non-serious atmosphere being cultivated by K and J (Turn 5b). MR continues to build into the joke by asking "oh really?" (Turn 6), during which J continues to smile widely (Turn 6b). This is shown to be laughable by R bursts into laughter after holding her breath, which she does while continuing

to hide her face with her head down (Turn 7, 7a) and J laughs two beats (Turn 8). Theories of laughter as a relief valve of sorts can easily be applied here (Morreall, 1987). The joke has been building for multiple turns through the mutual focus on the joke shown by the bodily posture and laughter, producing increased entrainment.

MR cedes that she is not sure as to what is going on (Turn 8), as she looks around the group as if searching for an answer as to what is going on (Turn 8a). Her not knowing and verbalizing that she is confused, cedes some of the power she has as the facilitator, allowing students to drive the goals of the setting. MR's utterance precipitates an outburst of laughter from R (Turn 10) which overlaps with MR's request for clarification (Turn 9,11). MR has caught on that there is something "funny" happening, but she expresses that she does not understand it. MR is constructed in this moment by the students as being outside of the joke and some of the laughter may be directed at her as she is now the butt of the joke—youth are laughing *at* rather than laughing *with* her (Glenn, 2003). Joshua and Kevin's construction of a joke shows the shifting of power as MR misses "getting" the joke and thus becomes an object of ridicule (Glenn, 2003).

MR repeats her request for clarification while looking toward R (Turn 12), which only serves to build the joke further as K, rather than choosing to clarify for MR looks at R with a non-smiling face that is blank of noticeable expression (Turn 13a) and requests that she stop praying (Turn 13). This use of mock-seriousness further builds the joke about praying as M begins to laugh (Turn 14). MR takes K's utterance as literal, asking if R is praying (Turn 15), but recognizing the non-serious atmosphere, she smiles at R as she asks (Turn 15a).

M interjects with a smile voice and sing-song voice through stress and elongation of syllables on his utterance that she is praying and crying (Turn 16). At this point, a division happens in the joke, R is laughing very hard into the desk, but N does not take up M's accusation that she is praying and crying, she looks to M (Turn 17a) and denies M's accusation at R (Turn 17). There is a division forming between K, J, and M who are all boys and the two girls, R and N. This shift shows the contingency of the moment and the joke developing based on the interlocutors available in the interaction (Davies, 2003). R draws in a loud breath to begin another laugh and flips her hair as she sits up then puts her head back down (Turn 18, 18a). N makes a request of one or all members of the group to stop (Turn 19). It can be argued that since her last utterance was in defense of R, as she is requesting the boys to stop laughing. Alternatively, as she looks down while she makes her request, it may be interpreted that her request is for R to stop laughing so uncontrollably

(Turn 19a). Her laughter and N's request to stop are interpreted by MR that she does not have an understanding of what is going on and she requests for further clarification (Turn 20) while looking from student to student (Turn 20a). As she asks, R has repositioned herself upright (Turn 21a), and says with a smile voice that they should pray (Turn 21). J, M, and K all continue to smile (Turn 22, 22a, 22b)

After the conclusion of the transcript, Kevin, Joshua, and Mon begin the repair of the joke by requesting that they start. MR is still not sure as to what is going on and admits it. MR's admission that she does not understand provides an openness to vulnerability and not knowing on her part that may provide space for the youth to engage in the setting. To assuage her confusion, Kevin supplies that they have been making a joke.

After this moment, the youth engage in a game of jeopardy focused on weather vocabulary words where J and K further coordinate their bodily postures and interact. Later in the session, as youth are discussing how people live in different climates, they have a discussion about a religious celebration that is held within the state they lived in in Burma (Myanmar). This discussion of the practices they have around religion may have been afforded by the negotiation of practice that occurred here in which MR did not block their suggestion to pray.

#### 4.3.2 Interaction Rituals and Affordances of Laughter

Initially, Joshua and Kevin show bodily entrainment by their bodies being oriented toward one another at the beginning of the interaction (see still at the beginning of the transcript, Turn 4a). Mon also integrates into their entrainment their aligned bodily posture, gaze, and shared smiles and laughs throughout the interaction (Turn 5a, 8a, and 14). These alignments and the building of the joke around the practice of praying offer a way to begin to build emotional energy and group solidarity for participation. I argue that Joshua, Kevin and Mon build group solidarity through continued joking in the jeopardy game which happens a few minutes after this episode concludes. This continued build-up of emotional energy and solidarity provides space for further discussion of religious practices in the Chin community which is primarily Christian. Additionally, this group solidarity is generated as Joshua and Kevin joke about MR not knowing what is going on functions to renegotiate the power dynamic in which MR directs activity in the setting—Joshua and Kevin not only suggest an alternative (prayer)—but enact an alternative to starting the day's lesson by building this joke. By challenging practice, they are negotiating what is appropriate for the science

learning setting and what is considered as part of science practice. By making a joke they are able to test out the boundaries of the practices allowed in the space in a careful manner, as the joke can be overlooked or brought back down to seriousness when the youth decide it needs to be, showing they are aware of their position of having less power than MR to facilitate the space (Dunbar, Banas, Rodriguez, Liu, & Abra, 2012).

This episode also illustrates the darker side of laughter as doing the work of excluding (Ikeda & Bysouth, 2013) and laughing *at* rather than *with* (Glenn, 2003). The joke and the laughter surrounding it have shifted from laughing *with* to laughing *at* Rosie. Rosie is now positioned as the butt of the joke rather than all the students sharing understanding and laughter around the joke about praying, this is in part because of Rosie's uncontrolled laughter, but remains an undercurrent to the following interactions in this session in which the three boys are in opposition to R and N as they play a game.

Rosie's uncontrolled laughter may be read by others as a transgression from feminizing forms of laughter which are typically quiet, controlled, and reproducing docility (Douglas, 2015). Laughter has been acknowledged as one of the modalities through which gender is practiced (Glenn, 2003). Rosie is entangled with this normalizing aspect of laughter as she tries to cover her laugh. N can be seen as chastising R for not following this normalizing discourse of femininity, and asking Rosie to align with normal, feminine laughter. This moment functions to see entrainment shift for being to strengthen rapport between all the youth—to it strengthening bonds between the three boys, Kevin, Joshua, and Mon at the expense of Rosie, and to some extent Nyunt. Here, the joke shifts from building entrainment for solidarity with MR as the brunt of it, to dividing the group along lines of gender. Rather than showing solidarity as one-dimensional, we see that the way in which Rosie is caught up in a laugh that is not entrained with the rest of the group, we can see that this interaction for her may not be as positive as she laughs out of sync with the rest of the group, thus group synchrony is not achieved with her and she becomes the subject of ridicule as she asks to pray when the boys were not intending to pray. This failure to pick up and laugh at the right time or in the right way shows how laughter can be isolating if it is not part of generating entrainment for all group members.

For Joshua, this moment is an important representation of how his participation changed throughout the course of the program. Here, Joshua instigates the joke by inserting his request to pray. Prior to this week, he did not speak much with facilitators and did not speak frequently in

the whole-group setting. Yet, here he is seen engaging in joke-making which is constructed around MR. By joking with the facilitator, he is negotiating not just the practices of the setting, but his footing with MR in interaction and contesting the position she occupies as a facilitator. I see the emotional energy afforded from his participation in this moment as positive for his trajectory in the learning setting. Wilmes and Siry (2018) show the emotional energy built by a student in subsequent interactions offers a way to increase his participation in science learning. Joshua's interactions in this episode are part of a trajectory in which Joshua spoke more and more and continued to laugh with facilitators. This sort of joking can be seen as a way of drawing on youth culture as combining practices of play with that of the science learning space (Daiute, 2005). The unscripted and contingent on context nature of joke making and subsequent laughter provided a way for Joshua to participate more in the learning setting as we will see in the third episode analyzed in this paper. The blending of practices and learning how to interact and make space for one's self with figures of authority, this is important for culturally non-dominant youth in learning settings as they create space for themselves to learn science (Bruna, 2010).

#### 4.4 Episode 3: "I want it in English"

##### 4.4.1 Situating this Moment Micro-ethnographically

This moment is drawn from the 17<sup>th</sup> session of the program where youth researched and created predictions for what would happen with continued climate change in different locations around the globe. When this moment begins youth are engaged in a gallery walk, presenting posters that youth have created about their predictions. There is a cacophony of sound and movement as many of the youth speak with one another and move about to look at the different posters. The three interlocutors in in this interaction are Joshua (J), MR, and Da Zin (DZ). Joshua is presenting his poster and has just finished talking to one of the other youths. MR is the main facilitator of the afterschool program who approaches Joshua to ask about his poster. Da Zin arrives as MR and Joshua are negotiating how he should present his poster. Joshua has been talking about his poster which focuses on what will happen in Greenland in 100 years with continued climate change. MR walks up, and as she does, she smiles at Joshua who glances up at her then looks down. She then positions herself against the board opposite him to look at his poster. As she does this, Da Zin walks up between them and looks at Joshua's poster. Joshua begins to speak with MR.

#### 4.4.2 Turn-by-Turn Analysis

Please refer to Table 4: Transcript for “I want it in English” in the Appendix for the conversation analytic transcript. Joshua looks down as he speaks at an audibly lower volume than in subsequent utterances as he admits they are not finished (Turn 1). This utterance can be read as him couching the ideas he put on the poster so as to soften judgment from MR. MR responds with a request for clarification marked by the upward rise in intonation of her voice (Turn 2). Joshua repeats his previous statement with added clarification from a quick gesture toward the poster (Turn 3, 3a). MR affirms that she understands what he has said by rephrasing his utterance and pointing to the poster (4, 4a). Joshua affirms that while incomplete, the poster still makes sense, as he does this, he acknowledges that the poster not being complete is not the ideal form for it to be in by clicking his tongue and glancing down (Turn 5, 5a). MR repeats what Joshua has said with the same intonation (Turn 6), this utterance is interpreted as a clarification as Joshua affirms what has been said. At the same moment Joshua notices Da Zin as evidenced by his gaze shifting in her direction over MR’s shoulder and the smile that spreads across his face (Turn 6a). There is a brief pause as he draws her into the interaction with his next utterance, he asks if she wants him to explain (Turn 7, 7a), yet this invitation to engage with Joshua is not taken up by Da Zin as she is looking away at this moment (Turn 7b) and misses that the utterance is directed at her. MR misunderstands herself as the recipient of Joshua’s utterance as she responds with an affirmation which overlaps with Joshua’s reference to telling Da Zin instead (Turn 8, 9). As Joshua does this, he looks away to another learner who he had just been interacting with before MR walked up, this may be to draw him in to the interaction, or to reference that the goal of the poster symposium is to present their findings to other students as he had been doing prior to his interaction with MR, the facilitator. MR acknowledges he is right about this as he is saying so (Turn 8), stepping back which provides space for Da Zin to step forward to view the poster and interact with Joshua (Turn 8a). Simultaneously with MR’s utterance, Joshua points to Da Zin and references her with his utterance (Turn 9a, 9). As he says this, there is laughter within his speech as evidenced by his smile voice and elongation of syllables with breathiness. This laughter can be interpreted as a way to soften his correction of MR that he should explain his poster to Da Zin rather than MR (Bell, 2009). The within speech laughter could be read as an invitation to laugh, but these invitations are not always taken up by the hearers (Glenn, 1991). The youth were directed at the beginning of the gallery walk to explain their predictions to one another, and his utterance can be seen as him directing MR

to allow him to go about the task as they were originally told to do. Joshua's laughter can be seen as a way to soften his criticism of MR's request within the interaction. He directs MR's attention to the idea that he should explain his poster to DZ instead of MR. This is done by his overlaying his turn with a laugh (Glenn, 2003). In this way, laughter offers a way for him to negotiate his authority with MR while not seeming to step out of the status of his position as a student.

At this moment, MR has the opportunity to censure Joshua or redirect his claim as she holds power to direct what is done in the setting as she is the main facilitator. Rather than directing Joshua to continue with explaining to her, MR takes Joshua's request up and gives the directive that Joshua explain to Da Zin (Turn 10). Da Zin holds her hands behind her back, taking the stance of someone who is visiting a poster in an academic context, offering a non-verbal gesture of play as a teacher (Glenn & Knapp, 1987).

Joshua begins to speak in his home language, Hakha, as he starts his explanation (Turn 11), pointing to the poster (Turn 11b). Da Zin interjects, asking for his explanation in English (Turn 12) with a smile on her face (Turn 12a). Joshua repeats her request as a question (Turn 13), as he does so, Da Zin begins to laugh, arches her back and angles her hips toward MR then toward Joshua (Turn 14a). This orientation of her body offers her request as a laughable that MR and Joshua may take up and share. This bodily laugh is echoed by MR who laughs visibly, but silently with her eyes squeezed shut and a wide grin on her face as she slightly throws herself back toward the board (Turn 14b). As MR and Da Zin share in this laugh, Joshua is looking at the poster tacked to the board where he has the hand he was using to gesture with (Turn 14c). His face is obscured in both camera angles that recorded this moment so his reaction to this laughable cannot be further interpreted, but evidence of a laugh is not seen in his body posture as he remains with his hand on the board, looking at his poster (Turn 14c). It may be that Da Zin is teasing him, positioning him as being less English proficient for using their home language instead of English. English was the language that Joshua and Da Zin shared with MR, using Hakha made his presentation inaccessible to MR. This consideration and the fact that English is the valued language in most science classroom spaces provides the possibility that Da Zin may be making a joke about his English proficiency. The potential that this is seen as teasing by Joshua is evidenced by him asking Da Zin for permission to explain as shown by the upward intonation of his utterance (Turn 15) and direction of his gaze to Da Zin (Turn 15a). Joshua's utterance is taken up as a request for permission as Da Zin affirms that he can explain in a smile voice (Turn 16), showing the echo of

her laugh on her face as the joke closes. Joshua then launches into an explanation of his poster in Hakha (Turn 17) and MR walks away as he continues to explain to Da Zin about how the changes in climate will make Greenland smaller due to its ice melting and make it more habitable for people and animals.

Joshua displays a complex understanding of causal relationship between global warming and Greenland's climate in discussion with the entire group. He does so both within the context of this interaction with Da Zin and at the conclusion of this session. Joshua shares his findings with the entire group in English—explaining the change in climate due to global warming will make Greenland more habitable for animals and people which is an echo of the explanation he offered to Da Zin in this episode.

#### 4.4.3 Interaction Rituals and Affordances of Laughter

In this moment we see how DZ constructs a laughable through bodily entrainment with MR (14, 14a, 14b, 14c). Whether her laughable is taken up by Joshua is difficult to tell from the video recording so the assessment of this interaction as his face is not captured in the video recording. An interactional perspective on the construction of jokes recognizes that a joke can allow for rapport building when done against a third party (Norrick, 2010). Jokes have been shown to be constructed as part generating group solidarity (Collins, 2004). In this moment, we see Da Zin creating a joke through the laughable she offers to Joshua and MR (Turn 14). Her joke can be read for the purpose of directing against the institutional discourse that may be represented by her teachers at school. In taking up this joke, Da Zin is building off the mutually shared focus and the tight formation of the triad she is forming with Joshua and MR to generate a stronger sense of collectivism as can be seen in the bodily entrainment of Joshua and MR to her as she interacts with them (Turn 7a, 7b, 8a, 9a). This can be seen as generating collective effervescence to continue interacting in the group and for producing solidarity in the afterschool space and generating emotional energy for Da Zin.

#### 4.5 Conclusion

In the findings detailed here, I examine three episodes of laughter and their significance for youth's participation. In the first episode I examine an interaction that took place as youth were researching to make a prediction about climate change and show its significance for how youth

went about preparing their poster with one another in the learning setting. In the second episode, I examine a joke that students made about beginning one session with a prayer and show its significance for engaging further with knowledge about religious practices in the setting. In the third episode, I examine an interaction about language selection for presentations in the setting. I draw out how solidarity is produced and negotiated in each of these episodes and show how the solidarity and EE produced through laughter has educative meanings such as being democratizing and offering youth ways to deal with uncertainty.

## CHAPTER 5. DISCUSSION

### 5.1 Affordances of Laughter for Participation

In the findings I showed how close analysis of moments of laughter reveals the embodied participation of learners and offered how the interactions around and in laughter provide localities that are important for youths' learning. The theorizing of laughter that I took up in this study argues for the potential that laughter has in building solidarity and negotiating power. Interaction rituals provide a mechanism to make sense of the affordances of laughter for youth to negotiate participation and incorporate their knowledges and experiences into the science learning setting. I take up the mechanism through which solidarity is achieved to make sense of how moments of laughter are linked to other moments in the learning setting. I show how laughter may provide an avenue for diverse knowledge and experiences to be incorporated into the learning space. As Tobin notes "it is important to embrace a value of supporting others' agency and assuming co-responsibility for facilitating others' goals. If this occurs, a likely outcome would be solidarity" (2012, p. 7). Solidarity provides a way to build coalitions along categorical identity markers, "such as race, gender, class, and native language" (Tobin, 2012, p.7). Youth made use of these episodes of laughter to open up spaces for their engagement in the space together. Through laughter, youth engaged in ways that they felt were useful for their goals in coming to an informal learning environment.

In the first episode, Efraim and Nwe contributed their own predictions, presenting their ideas as conclusions worth sharing with the group. Solidarity can then be used to shift the perceived distribution of power, in which they take the task to be making a prediction that makes sense to them rather than being about approaching a canonical interpretation of science. Laughing together enforces this cohesion (Glenn, 2003). Solidarity allows us to see how youth collectively negotiate practices, when resources may have been previously seen as things individuals bring, we see how they are negotiated in the micro-moment to allow for the meso-level context of the afterschool setting to arise. Laughter allows for solidarity among those sharing laughter, drawing learners together. Yet, this solidarity can also function against others in an interaction who they may be laughing at, providing a sense of boundaries between those who share in the laughter and who do not (Carty & Musharbash, 2008).

### 5.1.1 Democratizing

While laughter may be frowned upon in traditional science learning settings, it is essential and normal part of democratic science learning environments (Barton & Osborne, 2001). Laughter can be seen as breaking down power structures which reach into the classroom space from social and cultural structures. Laughter is useful in challenging the normative structure of science classroom activities. If as science educators, we are aiming to do democratic science teaching with the vision of “creating democratic and just societies,” laughter is part of these learning settings.

The placement of laughter in interactions where there is an unequal distribution of power, such as the case with facilitators and learners in this setting, is especially important to recognize that by engaging in laughter that is initiated by a facilitator, the unequal distribution of power is enforced (Glenn, 2010). As in the first case of Efrain and Nwe laughing with MT, we see MT break down the power relationship between herself and the youth to draw them into the science learning task on their own terms through joking and laughter. Laughter can be seen as democratizing (Vlieghe, 2014). Laughter is democratizing in that it offers learners the chance to revise power structures in a setting. Laughter breaks down power structures by returning us to our bodies and reminding us of universality of the human experience (Vlieghe, Simons, & Masshelein, 2011). Laughter’s uncontrollable nature disrupts any preordained hierarchy or order (Vlieghe, Simons, & Masshelein, 2011) it is a communal entity. As youth generate IR’s in science learning spaces, these do the important work of breaking and shifting the distribution and understanding of resources. As Collins states, the IR’s generated in learning particular materials are “important for macro patterns of stratification because the Bourdieu lock-step of reproduction of cultural capital within the same social class from one generation to the next can be broken, when successful rituals take place on the micro level” (Collins, 2014, p. 309). This radical shifting of the structures of classroom stratification offers how resistance and democratic learning environments come into being. Summers-Effler (2002) points to how the micro social work done in classroom spaces can be important for generating sites of resistance. The solidarity created from engaging in the moments explored here offers youth the opportunity to blend their practices with that of the science learning setting.

### 5.1.2 Reframing with Uncertainty and Ambiguity

Laughter allows for moments of ambiguity or uncertainty to be reconciled for learners to move forward with the learning task. In Reichenbach's analysis of the laughter of Bahraini women she found that the humorous mode allows for an embracing of ambiguity and contradiction within interactions (2015). Laughter functions to help learners engage with uncertainty, reflecting the emotive connection that laughter can help us make in learning. Laughter is often uncontrollable, offering a break in the façade of seriousness imposed by traditional science classroom discourse and providing a space for questioning what and how science education takes place. (Roth et al., 2011). Such as in the case of Nwe and Efraim, their uncertainty was at least in some part resolved by the laughter they took up around MT's joke. The solidarity produced in this episode and subsequent interactions Efraim and Nwe had in within session can be seen as working against norms of science discourse that purport everyday knowledge and judgements to be below that of science knowledge (Lemke, 1990).

## 5.2 Youth's Negotiation of Science Discourse and Resources

In each moment, we see youth engaged in negotiations for enacting their rich resources in the setting and argue for the generative quality of the interactions around laughter and joking. With the understanding that science education has historically been constructed on a basis of inequity (Chigeza, 2011), I draw on Tara Yosso's Community Cultural Wealth model and resource rich perspectives (Chigeza, 2011; Tobin, 2011) to examine and sense of the resources that youth bring to the learning setting and their meaning for negotiation of science practices. In a capacity-building perspective, marginalized youth being able to organize to challenge authority is part of what is needed to make a science learning environment that is not oppressive (Chigeza, 2011). Youth organize through these episodes of laughter as a means of resisting oppressive structures.

In the first episode, youth negotiated the power of canonical science discourse through their shifting view of the task. The open-endedness of the task challenges assumptions of certainty in science. Efraim and Nwe could not test their predictions because of the temporal aspect of climate change where many of the effects happen beyond a single human lifetime. Laughter offered space for them to engage with the uncertainty of climate change and science more broadly by drawing out participation through engagement with this uncertainty. In doing so, the task became more

about Nwe and Efraim's sense-making and less about suppling the "right" answer from Google. Through the solidarity established by engaging in the interaction ritual around joking, Nwe and Efraim were encouraged to draw on their imaginations and experiences for their learning. In doing so, Nwe and Efraim drew on the rich resources of their creativity to participate in the science learning community of the afterschool setting. The interactions in this episode can be seen as working against norms of science discourse that purport everyday knowledge and judgements to be subordinate to that of science knowledge (Lemke, 1990; Berge, 2017).

In the second episode, youth negotiated their everyday practices of praying with that of the learning settings, this is a way that youth connected their resources from home with that of science learning. Importantly, MR acts as a gatekeeper for this negotiation, and by accruing solidarity, youth draw on their capital to be able to blend their experiential resources. Yosso (2005) speaks of relationships formed within religious contexts as a source of familial capital, the interaction in the second episode and the subsequent further discussions about religious practices during that session as ways in which youth enact their capital.

In the third episode, Da Zin and Joshua negotiated the power relationship of English language in science. Their interaction provided solidarity around the translanguaging practices fostered in the setting. In sharing this moment of laughter, DZ, MR, and J were engaged in negotiation of the language norms of the afterschool setting. In previous sessions, MR encouraged youth to use whatever resources—linguistic and otherwise—they felt would help them best communicate their ideas to others. This orientation is recognized by educators who question the language norms of academic presentations within content areas (Bunch, 2014), and point to them as limiting for learnings from diverse linguistic backgrounds. By sharing in laughter, they were participating in the ongoing negotiation of the language norms and of science learning settings in general. Through laughter, they agreed that Joshua could explain in Hakha, challenging the school norm where learners would be expected to use English when discussing science phenomena. The shared understanding that English would be expectation in a school setting can be argued as what makes this moment laughable for MR and Da Zin in conjunction with shared understanding that this language norm is not taken up within the afterschool learning setting. Importantly, we see that Da Zin was negotiating space for drawing on linguistic capital in the setting (Yosso, 2005). This work is aligned with the ways in which individuals act for the good of the collective in acting as a way to expand the potentials for learning and agentive participation of others (Tobin, 2012).

This episode shows how youth's language resources are useful to their learning—that appropriate use and selection of language is a resource Joshua and Da Zin bring to the space and is an important navigational skill they have as multilingual learners (Yosso, 2005). Through Da Zin's role play of a person at an academic science setting she offers a critique of dominant science discourse that requires English as the language of display in science education contexts, in doing so she offers the idea as laughable to both MR and Joshua through her embodying the a person who would not take up using Hakha as appropriate in the setting.

The work done at the margins of what could typically be considered science discourse, provides space for students to play with language (Bruna, 2010), in the analysis in this thesis, laughter is seen happening around language selection and religious practices, drawing on these discourses of play for critical work of making space for youth's resources. This blends the notions of what is are the appropriate elements of the language of display in science communication with that of the language students use to formulate ideas (Bunch, 2014).

## CHAPTER 6. CONCLUSION AND IMPLICATIONS

### 6.1 Conclusions

I contribute to the body of knowledge on laughter in science education by drawing on a multimodal interpretation of conversation analysis to look at multilingual learners' interactions in this study. Combined discourse analytic methods of interaction rituals and multimodal conversation analysis provide a frame which is unique for understanding how laughter is linked with solidarity in the setting and learning. This study expands understandings of how youth negotiate and make space for their rich resources in responsive pedagogical spaces.

### 6.2 Limitations

The study in this thesis took place within the context of a larger study on the afterschool learning setting, thus it was not a designed-for project, nor was it an aim of the initial study plan. Laughter became an area of interest as it was prevalent in the afterschool program. This study is an effort to make sense of the interactional work that youth's laughter performed in the setting. This study offers laughter as a lens through which to view how the learning setting became a learning context as learners interacted with in the material space of the classroom in which the program was held, the responsive curriculum, with one another, the facilitators, and the broader social and cultural discourses present in the afterschool program.

A potential limitation of this work is the presence of a facilitator in each of the episodes investigated, which was partially due to the data collection methods followed in the space where the microphone that was synced to the camera video data was worn by the facilitator. The audio then biased data toward interactions with the facilitator, as often when students worked with one another they used their home language, which I did not understand. This dynamic made watching video data and selecting episodes for laughter more difficult as talk was not readily available to analyze for me as a researcher. Future work focusing on youth's laughter with multilingual students in science learning settings ought to attend to moments of interaction beyond an English-focused lens for episode selection and could do so in utilizing close connections with translators working with the community.

Another limitation of this work was that the analysis was done after interaction with participants concluded. To better understand participants' views on moments of laughter in the learning setting, it would have been preferable to do stimulated recall interviews shortly after their involvement and discuss the emotional impact of these moments on participants. This approach is aligned with interaction ritual approaches to science learning (Wilmes & Siry, 2018; Elmesky, 2015).

### 6.3 Implications

In taking up a line of inquiry on laughter, I have shown that moments of laughter, while often discounted, are actually important aspects of the science learning context and offer a view for how learners negotiate and make space for themselves to participate in science learning. While some research concludes that making students laugh is an important teacher move for fostering rapport and solidarity with students (Roth et al., 2011), attending to moments that illustrate youth's interactional work provides a lens that focuses on how learners are reacting to and speaking with instructors, placing focus on how youth negotiate their resources. As Berge took up within a collaborative physics inquiry setting, I examine how discourse of science is shaped in instances of joking (2017). Berge's research shows how youth use humor to incorporate a broader range of language repertoires beyond what is typically accepted in science learning (2017), the research in this thesis shows how youth drew their home language practices, and also their religious and everyday sensemaking practices through laughter and joking. The thesis work detailed here illustrates a connection between interaction ritual studies and research on laughter, focusing specifically on this embodied modality's implications for learning. In doing so, I expand the theoretical repertoire for approaching laughter in science learning beyond conversation analytic approaches alone.

I join researchers and educators pushing for responsive pedagogies and spaces for youth to engage with science content through a range of modalities (Wilmes, Fernandez, Gorges, & Siry, 2018). Laughter may seem trivial when a lens of science disciplinary content is the metric by which learning takes place. By expanding what might be considered science learning, I challenge insular notions of science learning and ask educators to consider the importance of the social work done within small moments around the fringes of what is easily recognizable as science discourse. Socialization is the work of coming to know a discipline and part of this knowing is the social ties

we make and the emotions we have about knowing and doing (Jaber & Hammer, 2016). Instead, these moments offer important locales for learners to negotiate their resources. Facilitators in this setting, as in other science learning settings, hold a greater amount of power than learners in deciding what the course of the lesson will be. Instead, pursuing lines of inquiry and educating youth to be able to question systems of power is necessary (Paris, 2012). In designing educational settings, I encourage educators to attend to moments where laughter is prevalent as important moments for embodied connection in the learning environment. Laughter and its adjacent emotion, joy, are important for broadening participation for science learners as moments of laughter and joy offer localities to question what it means to participate in science learning and who gets to participate (Scipio, 2017). I challenge educators and researchers to reconsider what could be written off as a “laughing matter” as being indicative of more learning than we might think.

## APPENDIX

### Transcripts

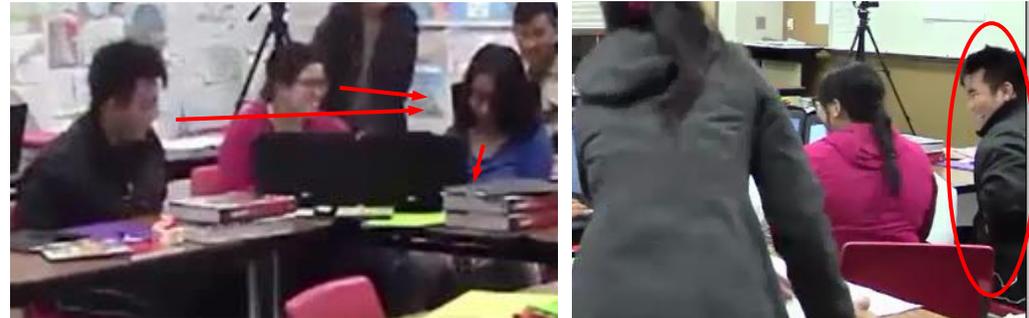
Table 2: Transcript for “We will have barbeque”

- 1 MT: What do you uh think Efraim?  
1a ((MT: looks at E, nudges E’s arm with her elbow))  
2 E: ↑Hnh hnh(0.8) •uhheh •uhheh  
2a E: ((E: leans back, puts hand on chin, puts hands in pockets))



- 3 MT: What do you think, what do you think about the animals?  
3a ((E: Leans forward looking at MT with mouth slightly open))  
4 MT: What do you think will happen?  
4a ((MT: turned toward E, gazing at him))  
4b ((E: leans forward to MT while smiling open mouthed with eyebrows raised))  
5 E: Mmm, they will die?  
5a ((E: looks down)) ((E: looks up at MT, smiles))  
6 MT: They will die.  
6a MT: ((MT: raises eyebrows at F))

7 E: °Yeah I think°  
 7a E: ((E: nods slightly))  
 8 MT: We will have barbeque::u (.)]  
 8a ((MT: Smiles, looks to N))



9 N: [hnh hn]h hnh  
 9a N: ((N: looks down to her lap, pushes hair out of her face while grinning))  
 10 E: [HAH huh huh heh heh heh  
 10a E: ((E: remains leaning forward turned toward N, leans back from MT and N with eyes closed))  
 10b MT: ((MT: continues smiling with a full grin))



11 E: •hhh uh huh  
 11a E: ((E: turns back to gaze toward MT))  
 12 MT: So that's (.)it's all a prediction so it's just like(.) kind of like asking you  
 12a: ((MT: gazes at Efrain))

12 MT: what (.) what (.) may happen  
 13 N: Kay (.) so there's no]  
 13a ((N: *flips hair* ))  
 14 MT: [You could]  
 15 N: [right er:r wrong answer]  
 16 MT: Yeah, no  
 17 N: [Eh heh]  
 18 MT: What you think is gonna happen if temperature keeps rising in Indianapolis.  
 19 N: Okay  
 20a ((MT: *gets up and leaves E and N*))

Table 3: Transcript for “Let’s pray first”



1 MR: Do you wanna lead the pray?  
 1a ((MR: *gazes toward J*))  
 2 J: (.) n-no (.)

2a ((J: laughs inaudibly with shoulders shaking and a wide grin)) ((J: hides face behind arm))



3 MR: No]

3a ((MR: remains gazing at J with hands on her knees))

4 MR: \*inaudible\*

5 K: [He say he's gonna(1.0)become a pastor]

5a ((K: has hand on back of head, turns body to sit turned toward J, looks toward J))

5b ((R: Puts head down on desk))



- 6 MR: Oh really? (1.0)  
 6a ((MR: remains looking at J with her hands on her knees))  
 6b ((J: continues to smile widely))  
 7 R: tss tee hah heh  
 7a ((R: Remains with head down, shoulders shake))



- 8 J: heh heh  
 8a ((J: looks from M to K, smiles widely))  
 9 MR: Ahuhmm (.)why]  
 9a ((MR: turns head to look from K to J to M to R and N))  
 10 R: [•hhh HAH hah]  
 10a ((R: remains with head down))  
 11 MR: [what is he says, so funny?]  
 12 MR: What is, what is funny?  
 12a ((MR: gaze remains fixed on R))  
 13 K: Stop praying  
 13a ((K: gazes toward R without smiling))  
 14 MR: •hh kkheh



15 MR: Ah (.) are you pray]ing?

15a ((MR: Smiles widely at R))

16 M: [£↑Pra::ying that she's ↑cry::ing£]

17 N: °No she's not°

17a ((N: Turns head to gaze at M))

18 R: •HHHeek heh uh

18a ((R: sits up, leans forward, sits back up and throws hair out of her face, puts head back down))

19 N: Sto:op

19a ((N: remains looking down as she speaks but turns her head toward R briefly))



- 20 MR: What is what was funny?  
 20a ((MR: Looks back and forth from K and J to R and N))  
 21 R: £Okay let's pray£  
 22 J: •hhh  
 22a ((J: smiles while leaning forward))  
 22b ((K and MR: remain smiling))

Table 4: Transcript for “I want it in English”

- 1 J: °I'm not fi::inish ye:et°  
 1a ((J: Looks up to gaze at MR, glances down))



2 MR: Wha?

3 J: We are not finish yet.

3a ((J: lifts arm points to the poster briefly))

4 MR: Oh↑ you haven't finished this

4a ((MR: looks up at poster, points to poster))



5 J: tsk (.) yes↓, but it's okay, it still makes sense(.)

5a ((J: gazes down)) ((J: looks up at poster))

6 MR: It makes sense  
 7 J: Yes (.) Do you need a θexplains:s (hhh) θ  
 7a ((J: looks down, looks up toward DZ, smiles a full grin))  
 7b ((DZ: looks away from J, remains looking away as he looks to her))



8 MR: Yeah] [Oh yeah -  
 8a ((MR: Steps back and turns to look at DZ))  
 9 J: [£(It (hh) cause and her:r (hh) £  
 9a ((J: quickly points to DZ)) ((J: looks away to JJ, smiles widely))  
 10 MR: Explain it to her (.)  
 10a ((MR: points to DZ))



- 11 J: **A tu hi**  
 11a Right now  
 11b ((J: steps back, turns body toward poster, touches different parts of poster))  
 12 DZ: I want it in English  
 12a ((DZ: holds hands behind back, smile spreads across her face))  
 13 J: Ah Eng]lish?  
 14 DZ: [↑ Hah ↑heh ↑heh •hhh heh heh tskhah hah heh heh ɛI'm kɪddi:ingɛ  
 14a ((DZ: angles hips toward MR while laughing)) ((DZ: turns body back toward J, clasps J on shoulder))  
 14b ((MR: laughs silently, grinning widely with eyes squeezed shut, slumps back against the board as her chest caves inward<sup>14b</sup>))  
 14c ((J: leans on hand which is resting on his poster on the board, looks at poster))



15 J: I can explain?

15a ((J: gazes at DZ))

16 DZ: £Yeah£

17 J: Okay **atu hi map si cu Greenland si i. Greenland cu ice lawng te an um cu mah ruang ah kan saram zong an tlawm ngai, minung zong an um rih natein khin hundred years ah cun vawlei kha a lum chinchin ruang ah khan, Greenland kha a hme tluahmah.**

Right now, this is the map of Greenland. Greenland is full of ice and because it's full of ice, there's a small number of animals living here. There are people as well but not as much. But in like a hundred years, as the earth heats up more, Greenland is getting smaller

((MR walks away))

18 J: **A hme lengmang i, ice kha a tlaw hme tete in, ice kha a um ti lai lo, saram hi a tu cu an um ko natein, a linh lengmang ah cun saram kha an um ti lai lo and minung tu kha an tam deuh men lai, ka ruahnak in..**

Since it's getting smaller, ice is starting to melt and there won't be any left. There are a small number of animals but if the sun and heats keep going up, there won't be any left and there will be more people, in my opinion..

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