

## Affiliation and alienation: hip-hop, rap, and urban science education

CHRISTOPHER EMDIN

The critiques of rap artists and other participants in hip-hop culture provide data for teachers and researchers to investigate the attitudes of US urban youth towards schooling. This study explores the complex relationships between hip-hop and science education by examining how rap lyrics project beliefs about schooling, the relevance of existing curriculum, and the intellectual capability of urban youth. These lyrics also provide a synopsis of this population's alienation from schooling and from science education in particular. By examining student discourses in two US high schools, this study shows how co-generative dialogues, and other classroom procedures derived from hip-hop culture, may be used to modify teaching and learning in science and to ameliorate urban students' alienation from schools.

Keywords: co-generative dialogue; hip-hop; rap; student alienation; urban science education; urban youth

Studies of the effective teaching and learning of science in US urban settings figure prominently in the contemporary research literature in science education. Such problems as overcrowding, limited resources, and inequities in distributing the resources available in urban schools have been examined. These problems are directly related in science education, as in other disciplines, to the achievement gaps between students in urban settings and their peers in other schools (Spillane *et al.* 2001). Although disagreements persist about the specific effects of larger social and economic inequities on the educational achievement of urban youth, the fact remains that some inequities do persist and are cause for alarm in the science education community—particularly because of the disproportionate number of US youth in urban settings who are not relating to science instruction in schools.

In addition, educators who believe in providing students of all racial, ethnic, and socio-cultural backgrounds with equal access to science have begun to examine inequities in science education from a social-justice perspective (Tate 2001). For these researchers, urban settings have proven to be sites in which much needed change in access and exposure to science should begin. Although this demand for change is admirable and necessary, the academic and educational challenges that have plagued these urban

---

*Christopher Emdin* is an assistant professor of science education at Teachers College, Columbia University, Box 210, 525 West 120th Street, New York, NY 10027, USA; e-mail: ce2165@columbia.edu. His primary research subject is science education, especially the development of new theoretical approaches to improving urban science education in the USA. His papers have been published in *Cultural Studies of Science Education*.

communities are compounded by years of disregard and invalidation, and by a positioning of the urban student as ‘other’ than the ‘normal’ student. Whereas the ‘normal’ student is perceived (in both the media and academic circles) as interested in succeeding in school, achieving in science, and demonstrating appropriate behaviour, urban students are regarded as uninterested in school, difficult to teach, and unable to do well in challenging academic subjects (Emdin 2007b). The collateral effects of being perceived as other than the norm (not being the ‘normal’ student), and being limited in access to appropriate material resources for engaging in a discipline like science (Norman *et al.* 2001), alienate many urban students from schools and widen already existing gaps between the culture of school and that of the students. On one level, students are neither perceived nor treated as full participants in science; on another level, inequities in the distribution of resources do not provide them with the tools to become full participants in science. In response, urban students often form alliances with each other under the banner of an out-of-school culture that treats them as full participants and provides them with tools for full participation. These alliances are often to hip-hop—a culture that embraces those who are considered outside the norm in the larger society, and who have been victimized by such factors as poverty or racism.

### **Validating the culture of the marginalized: hip-hop as culture**

Hip-hop, a culture with roots in alienation from an existing mould, offers a space of solace for students who are not allowed to participate fully in schools. In other words, when students feel alienated from school or from science, they often respond by deeply affiliating themselves with hip-hop culture. In many instances, this affiliation to hip-hop takes the form of a visible contempt for schools or science and an embracing of a harsh hip-hop exterior that masks a longing for full participation in what is going on in the classroom. Rather than involve themselves in the science classroom, students spend endless hours studying hip-hop lyrics, the lifestyles of artists, and the intricacies of the lives of rap artists and their media-created personas. I suggest that this embracing of hip-hop entails a set of actions and behaviours that should be accommodated for urban students in school classrooms, especially science classrooms. The close relationship that students have to hip-hop—which often begins with memorizing lyrics and extends to their enacting hip-hop practices and participating fully in the culture—provides the tools necessary for a connection to science. Thus, the passion students have for hip-hop should be ignited within conventional educational settings.

Initiating this alliance between hip-hop and science requires a retooling of urban science education (primarily through changes or supplements to existing curricula) and a reframing of the goals to provide an avenue through which social injustice is remedied and the voice of the urban student is heard. These processes require a close-up focus on hip-hop culture, especially on the delicate relationship between affiliation and alienation that underpins the reasons why some students are fully involved in science

education and why others are alienated from it. Under the umbrella of the large-scale reform and retooling that I recommend, there is also a need to reconstruct what is considered scientific knowledge in the classroom and to employ strategies that foster new approaches to pedagogy (Bybee 1995).

Implementing these new approaches in science education can most directly be achieved through a culturally rich science curriculum or through methods by which an existing curriculum is made malleable enough to meet the students' needs. Because the curriculum is the primary link between students and science, it can be used as the means by which under-achievement and lack of interest in school by youth engaged in hip-hop can be targeted. In other words, students' everyday experiences in school and in science are greatly influenced by the curriculum teachers use, and creating a curriculum that is malleable enough to incorporate student perspectives will benefit those students.

### **Hip-hop and curriculum: tools for developing student interest**

The notion of using curriculum as a tool for transforming science education has garnered the attention of scholars in such countries as Australia, Canada, New Zealand, and the USA (Ninnes 2002), in which there are large populations of people marginalized from conventional forms of education and deeply affiliated to hip-hop—'moving against the stream in time and space yet residing within the confines of a larger mainstream' (Condry 2002: 236). In urban settings in particular, many students affiliated with hip-hop attend educational institutions that do not understand or support their participation in that culture.

In urban students' perceptions, science education (as it is practised within their schools) is alien to their culture. It also stands as an extension of a pattern of schooling that focuses on the memorization of facts, provides few historical contexts of the subject-matter, and offers limited opportunities for students actively to investigate topics within the curriculum (Haberman 1991, Barton 2001). Even in the most progressive classrooms, in which students' interests are considered important, learning remains predominantly verbal and limits inquiry beyond the face value of words and notions (Huxley 1954).

This approach to education runs counter to how students engaged in hip-hop learn about themselves because hip-hop culture and rap, in particular, move beyond words and notions to include potential meanings, complex rather than conventional interpretations, and 'apparent meaning and metaphoric reference' (Keyes 2002). On these contrasts rests the perceived split between the culture of a hip-hop generation and culture of science and science education. I contend that this split is reinforced by the continuing implementation of curricula that separate the urban science classroom from the hip-hop community in which the school is located. As a result, students' culture and identity-formation around hip-hop become separated from identity-formation around school and science. Urban youth accept the fact that they are viewed as separate from, and other than, many of the norms in

society (including science and education) and express their culture in ways that celebrate their position as other-than school or other-than success in school. In one instance, a student in an urban science classroom where I conduct my research snatched a microscope that the teacher had prohibited him from using (because she thought he would break it) and applied it as a makeshift microphone as he struck a pose of a hip-hop performer on stage. The message was clear: the student was telling the teacher that if he could not use the microscope to engage in science, he would use it through hip-hop as a tool to show his anger against the teacher and against science.

### **Hip-hop and science class reality: ‘If I can’t do it homie, it can’t be done’<sup>1</sup>**

The lack of opportunities to express hip-hop culture (schemata and practices) in places such as science classrooms, by creating a paradigm in which conventional education limits students’ abilities to communicate or make decisions about the subject-matter at hand, is inherently undemocratic (Levin 1998). The undemocratic science classroom then becomes the place in which science cannot be studied because students are neither encouraged to participate nor sufficiently motivated to do so on their own. If hip-hop is a distinct culture (and I argue that this is the case), and students’ cultural resources are an important part of how they engage freely in school and science (Elmesky 2005), hip-hop and urban science education need to be closely connected in order to enhance the relevance of science and science curriculum. If the curriculum does not reflect this relationship, some students will embrace a hip-hop culture because it readily accepts them and their otherness within the dominant society.

By normalizing the culture produced by the existing curriculum (thus relegating hip-hop to other than the norm), students come to believe that they have to choose either the culture of schools and science or the culture of hip-hop. The connections that urban students have to each other within hip-hop effectively result in them being bonded together under their collective position as ‘other than’ the science classroom and hostile to the science classroom. This expression of what Oliver (2001: 42) describes as Fanon’s vision of ‘other-centred love’ is ‘for and between those othered by dominant culture [that] opens up new possibilities for recognition’. Those marginalized from society form a bond to each other and develop a culture that revolves around their stance as the ‘other’ and their affinity for rap, graffiti, dance, spoken work, or any other feature of hip-hop culture in which participants engage.

### **Reframing hip-hop: rap’s history, and a culture of affiliation**

In many academic and political discussions, hip-hop is often grossly oversimplified and narrowly described as a genre of music found in US urban areas. However, this superficial definition fails to acknowledge that hip-hop

is a distinct and complex culture, not just a musical genre. In other words, hip-hop is a way of knowing—replete with customs, belief systems, practices, and schematic understandings that are almost exclusive to those who are a part of the culture. Bourdieu's (1993) view of culture reflects this argument and serves as a useful means of defining the unique schematic understandings and practices of the hip-hop generation. Through Bourdieu's lens, I view the social practices of the hip-hop generation as the result of various schemata and dispositions (*habitus*), combined with various types of capital that come from the experiences of marginalized youth in the USA.

Although hip-hop may be regarded as a reflection of African-American and Latino/a youth culture (Rivera 2003), it has also grown to include an outgrowth of the life-worlds<sup>2</sup> of those from other groups who have been socially and economically victimized by their physical locations within 'inner city neighbourhoods' and symbolic positions as outliers of societal norms in various locations around the world. Hip-hop culture, enriched by the varying experiences of those marginalized by society, becomes the medium through which various factions develop an internal logic that provides a distinct set of requirements for participants. This distinctiveness in hip-hop is evidence of a coagulation of centuries of practices, rules, and understandings of alienated populations that have their roots in Black culture and traditions (Ramsey 2003). This Black lineage is derived from innumerable cultures, each with its own local understandings that pay tribute to its original form.

Cultures and traditions contributing to hip-hop have evolved in complex ways to capture and express the central concerns of marginalized populations in scattered contemporary urban settings. Feelings of experiencing seemingly eternally difficult social lives encourage the evolution of media that express the realities of those marginalized lives. 'Black music has always been a primary means of cultural expression for African Americans, particularly during especially difficult social periods and traditions' (Rose 1994: 184). Rap music (the primary artefact associated with hip-hop) is the text produced by hip-hop and the medium through which the culture is expressed.

The extension of rap from traditions in the Black experience in the US to contemporary urban life in oppressive social spheres in other countries has resulted in the appearance and display of characteristics that transcend space and time while they reflect the current real-life experiences of those within specific contexts. This attribute of rap (transcending space and time) is closely related to the chronotypic nature of certain literary texts that express an 'intrinsic connectedness of temporal and spatial relationships that are artistically expressed in literature' (Bakhtin 1981: 84). Rap music (the literature of many of those whose backgrounds are rooted in oral traditions) connects the histories of the marginalized, echoes their pain, and concurrently articulates the stance of new people who either have been, or are being, marginalized in different spaces around the globe. It is the expression in words of the realities of social actors in contexts in which they are either not allowed to participate fully or cannot be heard because their histories, traditions, and voices are different from that of a dominant group. The connectedness of participants in hip-hop to its origins and to each other results in a powerful affiliation of hip-hop to itself in its varied forms. This

affiliation is marked by subtleties in speech and action that signify the shared understandings of hip-hop to itself in its different forms. Thus, Rapper Jay-Z speaks to an international audience of hip-hop participants in his song ‘All around the world’:<sup>3</sup> ‘I put my hand on my heart, that means that I feel ya, real recognize real and you’re looking familiar’ (Carter 2002).<sup>4</sup> His words and the gesture he describes mark the same affiliation that urban students from various ethnic backgrounds in public schools have with each other. This affiliation and communality exists in a dialectical relationship with alienation. As such, hip-hop participants’ affiliation to other participants in the culture occurs concurrently with an alienation from people or institutions that do not support involvement in hip-hop. Hip-hop (the culture and its participants) rejects that which does not accept it, and embraces those who have also been excluded from the norm. The exclusion of the hip-hop participant from the norm in the justice system, the economic system, or the science classroom results in a ‘f\*\*\* the law’ persona, an ‘I don’t need your formal institution’ bravado, and for urban science teachers, an ‘I don’t care about science’ attitude.

In my research in secondary-school science classrooms with students from the Bronx and Brooklyn in New York City, I found that urban students’ hip-hop identities (originating in their life-experiences in the most socio-economically challenged and societally ignored areas of the city) are carried into urban schools in which students alienate themselves when they feel they are being excluded (in this case from science). Within science classrooms in these schools, students may begin a school year by struggling with, and attempting to involve themselves in science, and then, over time, make a choice not to be prominent in the classroom because they are not being validated and their need to be central is not being met. My research involved dialogues with these students which reveal that a large number who feel separate from the classroom are deeply connected to hip-hop. In fact, the more alienated they are in the classroom, the more connected they are to each other and to particular aspects of hip-hop culture. As a result of these observations, I suggest that there are deep connections/disconnections between hip-hop culture, urban youth identity, and urban science education that need to be revealed. Furthermore, I maintain that science education as traditionally practised may not sufficiently meet the needs of students who are a part of hip-hop culture if it is blind to the fact that this culture and its complex relationship to teaching and learning even exist.

*Witnessing affiliation and alienation with high school students*

New York High School<sup>5</sup> was established for students interested in working in the various health professions. The schools’ Latino/a and African-American students are actively involved in volunteering at local hospitals and nursing homes as part of their high school graduation requirements. Although many students are part of a demographic that is often classified as ‘low academic achievers’, one-on-one dialogues with students underscore their strong desires to perform well in science and school. From these dialogues,<sup>6</sup> I came to realize that many of them understand the importance of being successful

in science and being scientifically literate. In fact, many see their science classes as necessary hurdles to be jumped in order to reach their goals as healthcare professionals. However, despite their ability to voice the importance of science to their lives and their futures, many students enact practices, such as sleeping in class or disrupting the teacher's lesson that reveal that they are removed from, or lacking interest in, science. Consequently, a major need for this school (as indicated by science teachers, university researchers, and students when they had opportunity to study video-tapes of science classes in cogenerative dialogues)<sup>7</sup> was to target student lack of interest in and alienation from science.

Several miles away, Liberty High School, opened as a suspension centre for students with disciplinary problems (who have committed high-level infractions within other city schools), also struggles to engage students in science. Liberty High houses students who have often been written-off as academic and social failures by the schools from which they were suspended. Although the school staff and faculty try to provide high-quality instruction to the majority Latino/a and African-American youth who attend this school, they find that delivering science in a way that engages the student population is particularly difficult.

Despite racial and ethnic similarities between student populations in the two schools, conversations with university researchers and teachers in New York High (Emdin and Lehner 2007) reveal that perceptions of students' ability to engage in science vary because of the conditions under which the students are admitted to their respective schools. Because students at New York High elected to attend the school, they were expected to do well in science: because students at Liberty High were required to attend a suspension centre, they were not expected to do well. Because the New York High students were preparing for careers in allied health professions, expectations for their achievement in science were high in comparison to those for students at Liberty High. Nevertheless, measures of student interest at both schools were quite similar. At both New York and Liberty High, markers of student interest, such as their willingness to answer questions, their responses to teachers' questions, and their visceral responses to their science teachers at different points of their lessons, were similar. Videotaped science lessons studied by teacher researchers during cogenerative dialogues at both institutions uncovered distinct similarities in student behaviour and responses to teachers and science at both institutions.<sup>8</sup> The investigations at both schools revealed that everything from the topics covered, approaches to instruction being implemented, the level of depth explored in a given topic, and connections to real-world experiences in classroom teaching at both schools, were dictated by curricula that appeared to be similar in their apparent absence of the culture of students. In each case, it seemed that the existing curriculum made few attempts to bring students' life-experiences or interests into the science lessons.

To be fair to the respective curricula at both schools, the lessons being taught appeared to be free of any direct correlation to any kind of cultural understanding that may be shared by the population of either school. However, much research in science education rightfully concludes that a 'culture-free' curriculum does not exist and curricula and forms of teaching

may be deeply nested in a ‘Western’ approach to education (Roth and Lee 2004). In other words, the curriculum in both high schools can be interpreted as focused on cultural understandings that do not necessarily acknowledge the cultural backgrounds of students and, consequently, alienates them. It then becomes important to recognize that ‘if only we could understand how students make sense of their natural world, we could design a science curriculum so that science makes sense to all students’ (Aikenhead 1996: 2) and allows them to develop a closer relationship to science. However, to implement a science curriculum that involves the culture of the marginalized, the culture itself should be fully explored—in this case, to prevent the alienation of the urban student who is part of hip-hop.

### **The alienation of the hip-hop student**

By ‘alienation’, I mean the feeling that an individual experiences when he or she is excluded from discourse in school or in other social settings. This alienation is more deeply felt when the discourse directly involves a student, as witnessed by one student when she stated, in a semi-formal interview<sup>9</sup> with a university researcher, that ‘when the teacher is teaching he is in his own world ... and we are not in that world with him’ (fieldnote, November 2007). This reaction is characterized by Fanon (1967: 10) as the wiping-out of the customs and the understandings of a population to the extent that consciousness of oneself within a context (in this case the science classroom) is a ‘negating activity’. Thus, the experience of marginalized youth in schools in which they are isolated from their teaching and learning ‘negates’ them from the institution of schooling. Schooling thus becomes an activity in which a student’s self is first detached and then re-attached to something else. A focus on curriculum (however detailed) without either infusing it in the student’s culture or including aspects of student culture in its implementation, divides students from the school.

Science educators who work with marginalized students should enact curricula that incorporate both the study of macro-issues and their implications for students’ lifeworlds, not for the sake of breaching culture (which is a necessary but overladen argument in urban education) but for the sake of re-connecting students to science and school or creating an affiliation to science. In my research, reconnecting students to the classroom required that students from both New York High and Liberty High be invited to meet at New York High to discuss the issues they found most pressing to their lives as students and to their success in science.

At this meeting, the students’ comments on their difficulties with science instruction at both institutions focused on their feelings of being ostracized from what science was supposed to be—in their perception, a subject that is supposed to be filled with hands-on activities. In videotapes of science classes in both schools, collected over the course of the four-year research study, there was an apparent physical space on many occasions between the students’ desks and the place where the teacher in the science classroom stood. This physical space reflected a much larger symbolic space between students and science that contrasted with the camaraderie shared by



students from both schools as they sat and talked together about their shared experiences in not being able to feel connected to their science classrooms. This camaraderie was extended as students discussed their experiences in their respective neighbourhoods, the music they listened to, and the general similarities in their lives in Brooklyn and the Bronx. Their methods of communication, ways of indicating that they understood each other, and shared ways of talking revealed a shared ontology that transcended their geographic, ethnic, and gender boundaries and reflected their affiliation to each other and to hip-hop.

### **The principles of science and their relation to hip-hop: interrogating affiliation**

Focusing on hip-hop in the science curriculum requires acceptance of the notion that hip-hop may be used to connect students to school. This acceptance may be encouraged by acknowledging that both science and hip-hop attempt to generate a consensus in a community of practitioners, develop theories for making sense of the world based on observations, and validate or dispute these theories based on evidence that either supports or counters them. In science, new ideas are either supported or discounted on the basis of the general consensus of the larger scholarly community. In hip-hop, the relevance of an artist, or any trend within the culture, is generally controlled by the general consensus of those who are a part of the culture. Each way of presenting an idea in hip-hop is based on the distinct approach of the artist and the way he or she looks at the world. The artist's interpretation wins support from an audience if it corresponds to the audience's experiences or strikes the listener as a genuine expression of the artist's experiences. This bears a similarity to the value accorded to scientific research to the specific community, and to the acceptance of such work based on the individuals within the community's own experiences and research. This comparison suggests that, at its core, science stems from the same basic understandings as any specific population's approach to looking at the world—generating a consensus, and attaching value to what is proposed as a viable explanation to existing problems or phenomena (Nagel 1961). This fundamental understanding provides a basis for reconnecting alienated students to science as a discipline.

On a more elementary level, hip-hop may also serve as a tool for quickly sparking a student's interest, or—as teachers who endeavour to build student interest in a lesson often assert—a 'hook' to draw students into a topic prior to a more thorough academic discussion. Hip-hop should then be seen as a tool (or superficially a hook) for developing interest in science as well as a way of knowing that has qualities isomorphic to the nature of science. To find more authentic ways of using hip-hop culture in a classroom, educators should become immersed in student culture to the point that creating or enacting a curriculum reflects insider perspectives on students' hip-hop lifeworlds.

Currently, the growing emphasis in urban and science education in the USA on respecting and being sensitive to student culture does not include

recognition of hip-hop. In fact, scholars studying culture often marginalize certain populations. For example, a researcher studying a particular country may focus on that country's national culture and ignore the participants in hip-hop who often include the most marginalized in terms of achievement.<sup>10</sup> I contend that the fact that hip-hop is perceived as an urban US musical phenomenon, and not a culture of the marginalized, inhibits its ability to be recognized as a model.

On the other hand, many educational reformers and scholars recommend reframing science curricula (albeit through different theoretical lenses) in order to infuse student culture. They suggest, for example, that educators explore the modes of being and intellectual activity of science learners (Donnelly 2006), or use students' communities as a tool in science teaching (Barton 2001), or study personal narrative in teaching many socio-scientific issues (Levinson 2007). I note, however, that each of these perspectives is a component of broader movements that recommend close attention to learners' broader culture or suggest a reframing of science education to meet the needs of marginalized students. Such wider recognition of the importance of culture is needed to prompt ways of building affiliation to science among an ignored student population.

Some existing research on urban students already examines communities or discourse and the nature of their interactions from varied perspectives (Lemke 1990, Atwater 1996, Barton 1998). I contend that a more explicit focus on hip-hop culture and rap music is a natural progression for that research and provides a new point of entry for intellectual activity in urban science education. My work with students at both New York High and Liberty High made it clear that hip-hop is a phenomenon that evokes the deep passion necessary for involvement in science, despite being often ignored in discourse about schools and education.

### **Igniting the passion to connect students to science and the role of dialogue**

The passion for hip-hop possessed by students in urban schools is most evident in their painstaking attention to detail in scratching and blending records, banging for hours on lunchroom tables to create complex rhythms, perfecting raps by performing in front of the mirror and in small groups with their peers, and defying gravity while practising break-dance and other hip-hop moves. These connections to specific hip-hop activities are the direct result of students' belief that hip-hop is an essential part of themselves. The passion for hip-hop described by urban students (and also expressed by rap artists in songs) is similar to the 'love of science' or feeling of belonging to a 'community of scholars' that is often described by scientists when they are asked about their choice of science as a profession (DeMichele 2002). In my research I discovered that honing a passion for science in marginalized populations may be achieved when these individuals are allowed to discuss the structures of the science classroom with those who they believe are the instruments of their alienation from science (i.e. teachers, researchers, and administrators).

This task is not easy; it requires a shift in ideology, an uncovering of historically rooted biases, and an awareness that teachers and researchers have consistently privileged themselves and their voices even when they were purporting to be purveyors of social justice and equity. However, reflection on hip-hop culture and an understanding of the nature of dialogue within this culture will improve conversations in a science curriculum intended for students who are a part of hip-hop.

### **Cogenerative dialogue: conversations on curriculum and hip-hop**

Cogenerative dialogues, as discussed earlier, are ‘collective goal-oriented conversations’ about experiences that individuals share in particular social fields (Tobin and Roth 2005, Emdin 2008). ‘Fields’, in this context, refer to settings in which individuals communicate or work with each other. Consequently, cogenerative dialogues may be viewed as fields, other than existing ones, in which certain types of conversations occur. Conversations in cogenerative dialogues are based on certain basic rules of communication to which all participants commit; they require continual exchanges among participants until a collective goal is reached to improve a social field, equal turns and talk, and a mutual respect for all participants. These types of dialogues were enacted by students from both New York High and Liberty High at their respective schools and also at New York High when students from both schools met for a large-group meeting.

Such dialogues are similar in structure to a key piece of hip-hop, the ‘rap cypher’, in which rappers gather in a circle to recite their raps and exchange thoughts and ideas. In a rap cypher, participants have shared goals of showcasing their skills and encouraging all those in the cypher to exchange thoughts and ideas. The participants stand in a circle and form a social field that encourages exchange and mutual respect by supporting one another as they speak, and ensuring that all participate actively. Exchanges generated in the rap cypher allow for shared understandings to be distributed among participants.

Such exchanges, whether they occur in rap ciphers or in a cogenerative dialogue, usually centre on a specific topic of concern to all participants. In both cases, their structures encourage the exhibition of agency in ways that express the participants’ innermost concerns. Thus, the nature of hip-hop and its roots in communality and community are expressed in the rap cypher, and are inherited by cogenerative dialogues. The close connections among cogenerative dialogues, the communality of the rap cypher and hip-hop, encourage interrogation of relevant issues in science classrooms by students who are a part of hip-hop. The tenets of a dialogue—no voice privileged over another, equal turns at talk, and cogeneration of a plan of action to improve a field in which they share experiences—lead participants to understand that their collective experiences in urban science classrooms bind them together, despite their diverse racial and ethnic backgrounds. Cogenerative dialogues, like the rap cypher, provide all participants with a new discourse and a sense of fictive kinship in which they form strong bonds

to each other. In these dialogues issues traditionally not discussed in the classroom, despite their direct influence on teaching and learning, are now interrogated. In my research with students at New York High and Liberty High, students engaged in dialogues that examined their experiences in the science classroom and discussed possible reasons for their lack of interest in science. Through these conversations, many questions students chose to discuss were related to the curriculum's effects on their degree of engagement in science. These questions were then investigated and plans of action for solving them were co-constructed by students and teachers.

Although the introduction and implementation of cogenerative dialogues are usually successful, the legitimization of such dialogues used with students in New York High and Liberty High about hip-hop/rap and education was a topic that divided individuals who would ordinarily agree on the close relationship of student culture and education. In some instances, proposals about the dialogues were supported up to the point at which their correlations to the rap cypher or hip-hop were presented. The divergence at this critical point originated in negative associations often made between rap music and violence, misogyny, and gross materialism—associations that simply confirm the links between the hip-hop generation and an inability to succeed in school. These links to non-achievement are often made without any true justification or positive evidence; they mirror the joining of unfounded belief systems to established understandings that Said (1983) confirms as a persistent flaw of a global, Western-focused society.

### **Dialogue with students: fostering affiliation through cogenerated plans**

In one cogenerative dialogue (four students and one teacher) at New York High, students who expressed lack of interest in the chemistry classroom discussed the fact that they never learned about careers or jobs related to chemistry. They also maintained that their teachers made them feel as if they could not be successful in science nor follow the examples of the scientists mentioned in their textbooks. Further conversations revealed that students took solace from their non-involvement in science by participating in hip-hop (rapping, dance, music, spoken-word poetry) in which they could participate actively. Students also discussed the fact that they were perceived as 'unintelligent' by their teachers and not given the chance to express what they knew. Finally, they asserted that their abilities to debate, ask questions (beyond the superficial ones required by their teachers), and work together to create knowledge were not given audience within the classroom. In response, teachers either acknowledged that they were unaware of the importance of focusing on the issues the students mentioned or stated that the curriculum they were asked to teach constrained their abilities to meet students' needs. However, in more critical conversations in weekly dialogues, students and teachers together developed a new understanding of each other that led to new ways of teaching which involved every student in the classroom.

At Liberty High, teachers' perceptions about students' lack of interest in school, and particularly in science, were based on assumptions about their

histories in other schools and their exhibition of what was called ‘a hip-hop look’ and ‘baggy clothes and oversized tee shirts compared to the uniforms of the other kids’ (fieldnote, November 2007). In fact, interviews with science teachers in both high schools revealed many unwarranted assumptions about the relationship of hip-hop to a perceived lack of interest in science or education.

These conversations prompted me to engage in more detailed discussions with science teachers and students who are participants in hip-hop culture. These discussions often revealed students’ motivation and hopes to succeed academically, despite teacher perceptions to the contrary: ‘I want to get high grades, but I need my own [text] book’; ‘Getting good grades is cool; they just think we can’t do it’; and ‘Who doesn’t want to do well? I don’t know where they [teachers] get that’. Other student responses (e.g. ‘The lesson has nothing to do with us or anything that we do’) underscored a perceived failure of the curriculum to connect with students’ lifeworlds.

### **Other voices on school and schooling: rap lyrics as dialogue**

The content of lyrics written by several rap artists considered mainstream representatives of contemporary hip-hop underscore some key implications of hip-hop for science education that emerged from cogenerative dialogues with students. Several common themes in rap music may inform and enlarge urban science education curricula. These themes are articulated by artists to whom students from both New York High and Liberty High consistently listen. The decision to use the work of these artists is a conscious effort to illustrate how artists who are world renowned (and are often critiqued as examples of ‘bad rap music’) provide deep insight into education that mirrors the type of analysis that consumers of rap and participants of hip-hop express in conversations about their experiences in science classrooms.

Rather than rely on the work of hip-hop artists considered ‘underground’ or non-mainstream, I use the words of best-selling artists accepted and heard around the world (e.g. Jay-Z, 50 Cent, Kanye West) to show that education for marginalized populations is a prominent issue in hip-hop/rap music and the lives of the students who listen to the music.

*Hip-hop on school: ‘Wait till I get my money right’<sup>11</sup>*

Of the many issues that students mentioned in the large-group cogenerative dialogues and that artists present in rap music, the most common one was the question of the financial benefit of completing school. It is worth emphasizing that the belief that success in school is the great financial equalizer does not ring true for many people in US urban settings (Anyon 2006). The myth of job availability and the fallacy of increasing wages presented by the media and government officials conflict with the realities of inner-city students. Consequently, both rap artists and students who are a part of hip-hop maintain that institutionalized forms of oppression implemented through federal, state, and corporate policies do much to counter the

benefits of an education. Students notice that members of their own communities who are fellow-participants in hip-hop struggle financially after graduation from secondary school. They also see these individuals ending up in the same low-paying jobs that their parents had in previous generations. The experiences of urban students persuade them that the picture of success that is supposed to come from a formal education is not even remotely close to their reality.

This phenomenon is clearly described and analysed in rap when artists describe how the views espoused by school and the proponents of formal education contrast with student realities after they graduate from secondary school. Once these discussions are being heard in rap music, they immediately enter the existing discourse of urban students who consume the music. It becomes the responsibility of a science curriculum concerned with improving interest in science to recognize these messages from the students' culture, examine them in dialogues with students, and use in the classroom the cogenerated ideas from the dialogues.

One example of how issues directly related to school are presented in rap music is provided by rap artist Kanye West's (2004a) assessment of the financial worth of school:

Back to school, and I hate it there, I hate it there, everything you want you got to wait a year, wait a year. This n\*\*\*\* graduated at the top of the class, I went for cheesecake he was the m\*\*\*\*\* waiter there.

In this lyric, the artist describes the impact of seeing as a waiter a student who had graduated at the top of his class. In these words not only does he echo the words of students in cogenerated dialogues when they discuss the benefits of the financial worth of finishing school, he also inadvertently solidifies the thoughts of students who may be questioning the benefits of being successful in school. These lyrics describe the frustrations felt by students when they finish school without achieving any tangible goals. They also send a message about the need for curriculum to include information about the success in science of individuals who share a similar background/culture as current students. When Kanye West says, 'I hate it there, I hate it there', he voices students' feelings towards school and points the direction to be taken by those interested in improving schools or designing a pedagogy to investigate how these feelings impact the classroom.

The power of lyrics like Kanye West's cannot be ignored. The lyrics describe realities that need to be examined in schools because hip-hop is the voice of the students. They show that many students in the US inner city do not accept general notions of school success; fully aware of financial instability after graduation, they grow more frustrated yearly as they navigate the school system. Students who believe that school success necessarily leads to financial success are exposed to the reality that this is not the case. Given this reality check, students' connections to the classroom may be adversely affected.

The messages from rap underscore the importance of having the science curriculum reflect the opportunities for jobs, higher education, and financial stability that may be derived from scientific knowledge or achievement in science. It is important for curriculum designers to paint a picture of the

success in society that can follow success in schools. This should occur in conjunction with an understanding of, and openness in, discussing the reality that is experienced by many urban students from the hip-hop generation and have not seen financial success coming from a formal education. The urban educator who enacts an ethically and culturally responsible curriculum and who has demonstrated a value for students' cultures can bring a rap lyric like Kanye West's to the cogenerative dialogue, and discuss the reasons why the lyric was written and the possible folly of wholly taking the stance advocated by the artist.

In showing students that what they have seen as a lack of ability to get jobs after school is a reality that can be avoided through expertise in science, and in allowing the rap lyric to be a focus of discussion, teachers can display a valuation of student culture and provide an opportunity to ensure open discussions about school and education. By implementing cogenerative dialogues in the existing curriculum, these vital arguments can be introduced, discussed, and developed in the classroom.

By using rap as a tool for engaging students in a discussion on a scientific topic, teachers can draw attention to the large number of artists who become successful despite a poor record in formal education. Rapper 50 Cent on his debut album *Get Rich or Die Tryin'* (Jackson 2003) states that 'I'm the dropout that made more money than these teachers'. Echoing the same message, hip-hop mogul Jay-Z shares a similar sentiment in a free-style verse on an underground mixtape:<sup>12</sup> 'I'm the proud new owner of the Nets [a professional basketball team], no diploma no regrets' (Carter 2005). In these two quotations, the artists present themselves as high school dropouts who became financially successful. Given the wide range of audiences who ingest the words of these artists, ignoring the fact that such messages about school are assimilated by students simply widens the gap between in-school and out-of-school culture. In addition, making no effort to reconnect an ever-growing divide between hip-hop and the science classroom accentuates the difficulties of drawing those students who are a part of hip-hop into science studies.

Initiating discussions about why artists deem it necessary to make these statements about school may be a first step towards understanding the divides between the cultures of hip-hop, science, and education. In the cogenerative dialogues I have conducted, students were able to discuss the artists' lyrics and present clips from songs or interviews in which the rappers talk about occasions when their teachers have called them 'lazy' or told them that they 'would never make it'. This closer examination of the artists' work helped to explain their commentary on schools, provided a focus on curriculum and pedagogy that required lessons, activities, and exercises which affirmed students' intelligences and classroom contributions, and countered previous teachers' messages to which participants in hip-hop have grown so accustomed.

*Rappers responses to teachers: 'Can't tell me nothin'*<sup>13</sup>

The notion of the financial worth of school and its relationship to teachers telling students that they cannot be successful should be juxtaposed with rap

artists' equations of their financial success with proof of their intelligence. When people who have been perceived as unintelligent within schools become financially prosperous, they perceive their wealth as a signifier of the intelligence that they were once told that they lacked. This is evident in the proclamations of Kanye West (2004b):

[W]e ain't retards the way teachers thought. Hold up, hold fast, we make mo[re] cash, now tell my mama I belong in that slow class.

These lines, like many others, speak volumes about money being not just material/financial currency, but social and emotional currency that can buy back the classification of the artist being 'retarded' or in the 'slow class'.

The words of Kanye West, Jay-Z, and 50 Cent illustrate the gross materialism in certain types of rap music, and parallel an entrenched student belief that the production of economic, occupational, and educational losers is an inevitable result of the US capitalist system (Bowles and Gintis 1976). For many students in US urban settings, the message voiced by people in their schools, that they are part of the population of 'losers' in society, has become internalized. To counter these claims, rap artists work towards reversing the classifications that label hip-hop youth as less valued or intellectually incapable; they talk about their wealth in order to put down the teachers and other representatives of institutions that have down-played their intelligence in their past.

The terms 'slow' and being in the 'slow class' that Kanye West uses in the previous quotations are labels affixed to US students when they do not meet certain standards (often standardized examination scores) and are placed in classes with students with the same labels. Kanye West, in rapping about a collective group ('we') not being 'retards the way teacher thought', or not deserving to be in the slow class, speaks not only for himself but for a larger group of people with whom he affiliates. The lyric also shows that urban students are aware of the effects of 'tracking' by supposed intellectual ability and the negative portrayals of minority urban youth by teachers and schools. This tracking of students is often coupled with teachers being verbally abusive to students and enacting practices that reinforce negative stereotypes about students who are involved in hip-hop.

Such experiences are the norm for students in Liberty High simply because of their placement in a non-traditional school. In response, many rap artists offer lyrics or songs that describe the menacing voices of teachers asking students why they 'can't or don't learn', calling students 'lazy', or telling them that 'they won't amount to anything'.<sup>14</sup> The deceased rapper Notorious B.I.G (Wallace 1994), in the first song on his first album, begins with a dedication to 'all the teachers that told me I wouldn't amount to nothin[g]'. Rapper Jim Jones (2005), in his song 'My Diary', states 'I'm a product of the p-jects [i.e. housing projects], my teachers always told me that I'll probably be a reject'. The lyrics in these examples illustrate how rap music offers insight into students' perceptions of what occurs in classrooms that may not be apparent to people who are not privy to the daily interactions between teachers and students.

My purpose in discussing these issues here is to reiterate the need to use curriculum as a tool for validating students' complex modes of understanding



and speech that are not acknowledged in traditional science classrooms. Brown (2005) examines the use of students' ways of communication as a means of extending their scientific vocabulary. Expanding this notion to include not only the use of words, terms, and examples prevalent in rap and students' vernacular but also students' ideologies, concepts, and perceptions of schools may serve as a viable approach to both developing accountable science talk and creating a science classroom in which students' knowledge and concerns are not devalued.

To interrogate more closely hip-hop youths' perceptions of their lifeworlds and their impact on schools and science, it is necessary to listen to artefacts that paint images of the nature of students' lifeworlds and use the information learned from these artefacts as tools for building a culture rich curriculum.

**Perspectives on the separation of school life and real life:  
'This is grown man business, I am not in school'**<sup>15</sup>

In the song 'In My Hood' (Jackson 2004), rapper Fabolous discusses the absence of what is often considered the penultimate achievement of those who go through a formal education system within the urban community—in one lyric, he says, 'ain't no diplomas or degrees, but you can get high from the aroma of the trees'. In these words, he describes what it is like to live in his neighbourhood and offers insight into the life of hip-hop youth. He does not detect people who have graduated from high school or college, but he does notice rampant drug use. While this line may be viewed as a mere description of the artist's neighbourhood, in reality it is an instance of the need for students to witness the presence of role models who are successful graduates of high school. This need for positive role models is further uncovered in the same song: 'no Sesame Street kids watch B.E.T,<sup>16</sup> look up to n\*\*\*\*\* who ain't got a G.E.D'.<sup>17</sup> Similarly, rapper Nas in his song 'These are our heroes' (Jones 2004) alludes to the fact that the hip-hop generation lacks positive role models: 'these are our heroes? thanks a lot, public school system still rots, still runnin' from cops'. In these lyrics, the emergence of a collective need becomes apparent for role models from the communities of marginalized youth. Tying this need into the science curriculum and using it as a curricular resource is an obvious way to attract students to the discipline.

Hip-hop has repeatedly informed educators that schools, although physically part of their communities in the US inner city, have been isolated from those communities for decades. The separate cultures of school and outside-of-school make the close physical proximity to each other irrelevant in comparison to the socio-emotional distance in ideology and belief, as the messages from hip-hop music and cogenerative dialogues make clear. This distance is extended to the relationship between school and science and causes those positive attributes students exhibit outside the constricting structures of the school to be rarely expressed within the science classroom.

Students in urban schools have been able to connect hip-hop and science when given the opportunity to do so in cogenerative dialogues. Successful

outcomes of the dialogues have shown that a validation of student culture, an understanding that the effective cogenerative dialogue is a tool deeply rooted in the tenets of hip-hop, and an acknowledgment that both students and teachers are co-developers of a functional curriculum, lead to student academic success.

### **Connecting hip-hop to science through students and cogenerative dialogues**

In cogenerative dialogues I have been engaged in, I observed that when students initiated exchanges with teachers and each other about ways to improve the science curriculum, they communicated by using analogies. Analogies are also found in rap music and are the segments of rap songs that students remember most clearly. However, in the classrooms in which I conducted research, these analogies were under-used in science instruction. In instances where they were used and incorporated into the curriculum, the outcomes of that use were classroom conversations that provided deep understandings of science (Emdin 2007a). Teachers' use of such analogies as those described here (comparing issues, topics, realities of student experiences) displays a sympathetic desire to understand the students' culture. Once that appreciation of the students' culture has been expressed, a teacher can critique aspects of rap music that appear to be hostile to schooling and open up avenues for critical discussions of hip-hop, rap, and science.

While the use of analogy to connect rap and science education may appear as an unnecessary extension of the curriculum, it has proven to be an essential step in fostering interest both in science and in school. The use of complex analogies in rap music, and the ability to make obscure references to issues that appear to have no direct relationship, are markers of the most respected and gifted rap lyricists, and are also a necessary attribute of a successful urban educator. When these analogies have been used in the science classrooms where I have taught and conducted research, heightened levels of student interest, increased emotional energy, and high student participation have been documented (Seiler 2005).

#### *Cogenerative dialogues and analogy: student recommendations for the science curriculum*

After a biology lesson on the sustainability of ecosystems and the resources necessary for maintaining stability within them, students met in cogenerative dialogues to discuss ways for improving both their understanding of the lesson and ways the teacher could modify the curriculum to make it more engaging. Students were able to describe how ecosystems that appear unchanging over decades may be undergoing significant changes under the surface. They were also able to relate this phenomenon to the images of financial stability that artists maintain and the difference of those images from the realities they experience. This analogy was extended to include the different factors required to maintain a standard of living for artists and then compared to the factors

required to maintain an ecosystem. While I initially dismissed students' conversations and considered them superficial, the teachers within the cogenerative dialogues were able to acknowledge that the students' use of analogy was an indicator of an opportunity to use their cultural knowledge as a tool in the classroom. In this particular instance, the use of analogy generated by students in cogenerative dialogues became the main driving force of the teachers' future lessons and the chief motivator of students to participate in subsequent classroom discussions on ecosystems.

The use of analogy to connect the students and their lifeworlds to science was also apparent in a cogenerative dialogue based on a chemistry class in which students compared an artist's relevance to his audience with the distance between objects and the electrical force between them. This particular analogy described how the distance between a rap artist and his audience was related to the artist's 'realness' or ability to be respected in the immediate neighbourhood. Other students made this same comparison between an artist's relevance and his or her financial success. The idea presented by the students was that the further the distance between two objects, the weaker the electrical forces between them. In comparison, the further a rapper is from his or her community, the further away he or she is from being respected by the community. This conversation eventually extended into talk about atoms that gained or lost electrons and artists who gained fame and lost hip-hop fans because of their commercial success. As in the previous example, this discussion became a spark for conversations that improved the teacher's ability to teach certain subject-matter and became a curricular tool the teacher was able to use in the future.

In this same group, a different discussion based on a polymer chemistry lesson yielded analogies between the formation of polymers from monomers and the ways that rap artists 'have each other's back'<sup>18</sup> and form larger groups or crews. When given an opportunity to extend these discussions in the classroom, comparisons were also made between the bond between groups of artists or neighbourhood crews and the irreversible chemical process of thermosetting, which for students mirrored the strong bonds between members of rap groups or crews or the camaraderie developed when people 'are from the same hood'.

The validation of the complex comparisons that students were able to make between hip-hop and science eventually led to additions to the curriculum in different classes. After students saw that their thoughts and ideas were being validated in the cogenerative dialogues and in the classroom, they began to discuss matters beyond analogies that could be used to improve classroom instruction, and to examine more general ways that students could bring their communities into the school and the science classroom.

### **Supporting the science curriculum: the school community as a curricular resource**

In many cogenerative dialogue discussions, one major theme was the importance of reaching out to the individuals perceived by students to be role models and having them be active participants in the school science

curriculum. In one instance, students recommended that selected people in the community be employed as teaching assistants so that their expert knowledge in local disciplines could be expressed in the classroom and used to connect students to science while merging in-school and outside-of-school worlds.

In my role as a science teacher in schools, I have identified participants in hip-hop culture within the community of the school that have jobs, careers, and interests directly or indirectly related to, and able to improve, the science curriculum. These individuals have included graffiti artists who are experts in painting with aerosol paint, people who use harsh chemicals in working with cleaning equipment, and local rap artists who have discussed the physics of soundproof booths in the studios where they record and the science involved in the recording process.

These individuals have been contributors to science lessons that examined the chemistry of tin-plated steel containers, of aluminum used for aerosols, of the dyes and pigments that they use in their work, and of such solvents as water, alcohol, and acetone used to dilute active ingredients to the appropriate concentration. In every such situation, the levels of engagement for students who are a part of hip-hop have been substantially increased, compared to other classroom lessons. This fact reiterates the need for a focus on hip-hop in schools, and speaks to the power hip-hop has for providing agency to minority youth and encouraging them to engage in science. The benefits of cogenerative dialogue in allowing students who are a part of hip-hop to engage in science have been supported by the findings of a research project that focused on allowing students to create their own rap songs within a science classroom (Varelas *et al.* 2002). In this study, students demonstrated increased levels of interest, ownership, and pride in their work when they were able to use rap music as part of their classwork. This research affirms the importance of using rap in the science classroom and supports the use of hip-hop to connect students to the science classroom.

## Conclusion

Rap music is the primary artifact through which urban youth of various backgrounds come together collectively to escape the oppressive structures of urban settings (Baker 1991). Local communities of hip-hop enthusiasts and rappers can be found throughout the world. In Canada, Germany, Japan, the USA, and other places in which populations of urban youth are marginalized, active hip-hop communities come together under the banner of their exclusion from the mainstream culture. A microcosm of how this process occurs can be seen in the Bay Area of California where ‘young people of different colours, creeds, and cultural ancestry have made hip-hop an incredibly vital fountain of identity and creativity, expression and exploration, pleasure and politics’ (Watkins 2005: 164). In the Bay Area, as in other places across the globe, the realities of oppressive structures for marginalized youth across the African Diaspora and beyond create an international arena for studies of hip-hop culture and rap music (Bennett 1999)

and provide a justification for considering their curricular impacts on urban science education.

Efforts to dismiss hip-hop reflect an ignorance of its effects on large numbers of youth around the world who are both consumers and producers of rap music. Furthermore, the internationalization of rap music by record companies in an effort to market the music to diverse consumers has translated into an internalizing of the culture of which the music is an offshoot, and an even larger exposure of rap and its dialogic quality to marginalized youth across the globe.

While the marketing of hip-hop culture (and rap music in particular) has resulted in its commodification, an exaggeration of its negative aspects, and an obscuring of its power as a generation's critique of society and schools, it has allowed the culture to become transferred to communities that have been perceived as outsiders in the world. For these populations to become involved in science and science education, the legitimization of curriculum components in science education that vary from mainstream 'Western science' ideologies and belief systems should be considered (Bencze 2000). In addition, science educators and researchers should also be willing to go beyond conventional notions of culture and begin to consider what a culture entails, whose schemata and practices are legitimized enough to be valued as culture, and ways that these new parameters can help educators identify what should be incorporated into curriculum in order to connect students to science.

My goal in this paper has been to demonstrate that a study of hip-hop culture is worthy of exploration by teachers with a great number of students who live and breathe hip-hop. Students' lack of interest in school or science may be connected not so much to teacher instruction or ability but rather to those broader issues (in schools, and the society at large) being discussed in rap music and by participants in hip-hop. The awareness of the austere possible outcomes of one's future after leaving school, the invalidation of students' culture in the science classroom, and the lack of self-worth and confidence that comes with being devalued in the classroom are all important cultural concerns that lead to lack of interest in science. As educators become aware of these concerns and their implications for teaching and learning, they should be taken into consideration in designing instruction intended to meet the needs of a growing hip-hop generation.

### **Acknowledgements**

I thank Ed Lehner for kindly allowing me to partake in his work with his high school students. I also thank the students and teachers at New York High and Liberty High for sharing their time and expertise.

### **Notes**

1. The phrase 'If I can't do it homie, it can't be done' (Jackson 2003) is a lyric of rap artist 50 Cent that describes the self-motivation inherent in being hip-hop that has a double meaning. In a sense it means that if one is not given access to something then it will not be done or if one cannot do something it is because it is impossible to do.

2. 'Lifeworlds' in the context of this paper refer to the immediate lived experiences of urban students who come together to form a unified experience or set of experiences.
3. References to music are listed in a separate section at the end of this paper.
4. This quote describes how the affiliation that participants have to each other can be identified by participants in the culture, both by a physical placing of one's hand on the heart (signifying solidarity) and by an unwritten or unspoken recognition of each other.
5. New York High and Liberty High are pseudonyms for schools in New York City.
6. The primary research project was conducted at New York High School with a revolving group of four-to-six students with their teachers in structured dialogues over the course of 4 years (2004–2008). Supplementary research was conducted at Liberty High School in a collaborative research project (for details, see Emdin and Lehner 2007).
7. These dialogues traditionally occur with four-to-six participants. In this study they included traditional dialogues with four-to-six participants within each school from 2004–2008, and also multiple co-generative dialogues where multiple 4–6-person groups congregated in one social space during the Liberty High and New York High group meeting in 2007. Cogenerative dialogues were usually based on video-taped lessons from science classrooms that were played and discussed with students, teachers, and university researchers.
8. As a result, the science lessons and curriculum at both institutions were examined by teachers at both schools in order to discover any connections to the types of similar responses that the students were giving at their respective institutions.
9. Semi-formal interviews were conducted throughout this research study. They involved invitations by the researcher to a student or students to clarify an observation in the classroom or a researcher's fieldnote (see May 1989).
10. For example, transformative research on Maori education in New Zealand and on American-Indian students in the USA describe the role of science and science education in marginalizing youth (Durie 1996, Davidson and Miller 1998, Corsiglia and Snively 2001). However, researchers do not discuss the growing hip-hop populations within these marginalized groups.
11. Many who are part of hip-hop culture use this phrase. It is used on a Kanye West (2007) song in which he mentions that once he gets money, no one will be able to critique/comment negatively about him or his music.
12. An underground mixtape is a collection of new, unreleased, or free-style (impromptu/unrehearsed) raps that are recorded and circulated in the hip-hop community often without the backing of the record companies with which the artists have signed contracts.
13. This phrase is also one used by many who are part of hip-hop culture (see Note 11).
14. Many examples in rap music can be found to support this point. These include lyrics from each of the artists presented in this paper as well as songs by Dead Prez (Clayton and Mutulu 2000), Black Star (Smith and Green 1998), and others.
15. This is part of lyric by rap artist Mos Def (Smith 1999) that alludes to the fact that to be a man or to be handling man business he will not be relegated to being less than a man as is the norm within urban schools.
16. Acronym for Black Entertainment Television, a US cable network targeted at urban black youth audiences.
17. Acronym for the General Educational Development test. Passing the test indicates that a person has fulfilled requirements for a high school diploma.
18. The term 'having one's back' is a major tenet in hip-hop culture and describes an 'all for one and all for one' ideology that is evident in rap groups from around the world. Hip-hop culture often focuses on group solidarity in an effort to counter oppression by larger societal forces.

## References

- Aikenhead, G. S. (1996) Science education: border crossing into the subculture of science. *Studies in Science Education*, 27(1), 1–52.
- Anyon, J. (2006) *Radical Possibilities: Public Policy, Urban Education, and a New Social Movement* (New York: Routledge).

- Atwater, M. M. (1996) Social constructivism: infusion into the multicultural science education research agenda. *Journal for Research in Science Teaching*, 33(8), 821–837.
- Baker, H. A. (1991) Hybridity, the rap race, and pedagogy for the 1990s. *Black Music Research Journal*, 11(2), 217–228.
- Bakhtin, M. M. (1981) *The Dialogic Imagination: Four Essays*, ed. M. Holquist, trans. C. Emerson and M. Holquist (Austin, TX: University of Texas Press).
- Barton, A. C. (1998) Teaching science with homeless children: pedagogy, representation, and identity. *Journal of Research in Science Teaching*, 35(4), 379–394.
- Barton, A. C. (2001) Science education in urban settings: seeking new ways of praxis through critical ethnography. *Journal of Research in Science Teaching*, 38(8), 899–917.
- Bencze, J. L. (2000) Democratic constructivist science education: enabling egalitarian literacy and self-actualization. *Journal of Curriculum Studies*, 32(6), 847–865.
- Bennett, A. (1999) Hip hop am Main: the localization of rap music and hip hop culture. *Media, Culture Society*, 21(1), 77–91.
- Bourdieu, P. (1993) *The Field of Cultural Production: Essays on Art and Literature*, ed. R. Johnson (New York: Columbia University Press).
- Bowles, S. and Gintis, H. (1976) *Schooling in Capitalist America: Educational Reform and the Contradictions of Economic Life* (New York: Basic Books).
- Brown, B. A. (2005) The politics of public discourse: discourse, identity and African-Americans in science education. *Negro Educational Review*, 56(2–3), 205–220.
- Bybee, R. W. (1995) Science curriculum reform in the United States. In R. W. Bybee and J. D. McNerney (eds), *Redesigning the Science Curriculum: A Report on the Implications of Standards and Benchmarks for Science Education* (Boulder, CO: Biological Studies Curriculum Study). ERIC ED 433 179.
- Condry, I. (2002) A history of Japanese hip-hop: street dance, club scene, pop market. In T. Mitchell (ed.), *Global Noise: Rap and Hip-Hop Outside the USA* (Middletown, CT: Wesleyan University Press), 222–247.
- Corsiglia, J. and Snively, G. (2001) Rejoinder: infusing indigenous science into Western modern science for a sustainable future. *Science Education*, 85(1), 82–86.
- Davidson, D. M. and Miller, K. W. (1998) An ethnoscience approach to curriculum issues for American Indian students. *School Science and Mathematics*, 98(5), 260–265.
- DeMichele, J. (2002) Why scientists do science: a trek for answers. *Journal of Young Investigators*, 6(1). Available online at: <http://www.jyi.org/volumes/volume6/issue1/features/demichele.html>, accessed 4 December 2008.
- Donnelly, J. (2006) The intellectual positioning of science in the curriculum, and its relationship to reform. *Journal of Curriculum Studies*, 38(6), 623–640
- Durie, M. H. (1996) Maori science and Maori development. *People and Performance*, 4(3), 20–25.
- Elmesky, R. (2005) ‘I am science and the world is mine’: embodied practices as resources for empowerment. *School Science and Mathematics*, 105(7), 335–342.
- Emdin, C. (2007a) Exploring the contexts of urban science classrooms. Part 1: investigating corporate and communal practice. *Cultural Studies of Science Education*, 2(2), 319–341.
- Emdin, C. (2007b) Exploring the contexts of urban science classrooms. Part 2: the emergence of rituals in the learning of science. *Cultural Studies of Science Education*, 2(2), 351–392.
- Emdin, C. (2008) The three C’s for urban science education. *Phi Delta Kappan*, 89(10), 772–775.
- Emdin, C. and Lehner, E. (2007) Moving toward research collaboration in urban schools. In S. M. Ritchie (ed.), *Research Collaboration: Relationships and Praxis* (Rotterdam, the Netherlands: Sense Publishers), 59–70.
- Fanon, F. (1967) *Black Skin, White Masks*, trans. C. L. Markmann (New York: Grove).
- Haberman, M. (1991) The pedagogy of poverty versus good teaching. *Phi Delta Kappan*, 73(4), 290–294.
- Huxley, A. (1954) *The Doors of Perception* (New York: Harper & Row).
- Keyes, C. L. (2002) *Rap Music and Street Consciousness* (Urbana, IL: University of Illinois Press).
- Lemke, J. L. (1990) *Talking Science: Language, Learning, and Values* (Norwood, NJ: Ablex).

- Levin, B. (1998) The educational requirement for democracy. *Curriculum Inquiry*, 28(1), 57–79.
- Levinson, R. (2007) Promoting the role of the personal narrative in teaching controversial socio-scientific issues. *Science and Education*, 17(8–9), 855–871.
- May, K. A. (1989) Interview techniques in qualitative research: concerns and challenges. In J. M. Morse (ed.), *Qualitative Nursing Research: A Contemporary Dialogue* (Rockville, MD: Aspen), 171–181.
- Nagel, E. (1961) *The Structure of Science: Problems in the Logic of Scientific Explanation* (New York: Harcourt, Brace & World).
- Ninnes, P. (2002) Discursive space(s) in science curriculum materials in Canada, Australia and Aotearoa/New Zealand. *Journal of Curriculum Studies*, 34(5), 557–570.
- Norman, O., Ault, Jr., C. R., Bentz, B. and Meskimen, L. (2001) The Black–White ‘achievement gap’ as a perennial challenge of urban science education: a sociocultural and historical overview with implications for research and practice. *Journal of Research in Science Teaching*, 38(10), 1101–1114.
- Oliver, K. (2001) *Witnessing: Beyond Recognition* (Minneapolis, MN: University of Minnesota Press).
- Ramsey, Jr., G. P. (2003) *Race Music: Black Cultures from Bebop to Hip-Hop* (Berkeley, CA: University of California Press).
- Rivera, R. Z. (2003) *New York Ricans from the Hip Hop Zone* (New York: Macmillan).
- Rose, T. (1994) *Black Noise: Rap Music and Black Culture in Contemporary America* (Middletown, CT: Wesleyan University Press).
- Roth, W.-M. and Lee, S. (2004) Science education as/for participation in the community. *Science Education*, 88(2), 263–291.
- Said, E. (1983) Opponents, audiences, constituencies and communities. In H. Foster (ed.), *The Anti-Aesthetic: Essays in Postmodern Culture* (Port Townsend, WA: Bay Press), 135–159.
- Seiler, G. (2005) All my life I been po’: oral fluency as a resource for science teaching and learning. In K. Tobin, R. Elmesky and G. Seiler (eds), *Improving Urban Science Education: New Roles for Teachers, Students, and Researchers* (Lanham, MD: Rowman & Littlefield), 113–130.
- Spillane, J. P., Diamond, J. B., Walker, L. J., Halverson, R. and Jita, L. (2001) Urban school leadership for elementary science instruction: identifying and activating resources in an undervalued school subject. *Journal of Research in Science Teaching*, 38(8), 918–940.
- Tate, W. (2001) Science education as a civil right: urban schools and opportunity-to-learn considerations. *Journal of Research in Science Teaching*, 38(9), 1015–1028.
- Tobin, K. and Roth, W.-M. (2005) Coteaching/co-generative dialoguing in an urban science teacher preparation program. In W.-M. Roth and K. Tobin (eds), *Teaching Together, Learning Together* (New York: Peter Lang), 59–77.
- Varelas, M., Becker, J., Luster, B. and Wenzel, S. (2002) When genres meet: inquiry into a sixth-grade urban science class. *Journal of Research in Science Teaching*, 39(7), 579–605.
- Watkins, S. C. (2005) *Hip Hop Matters: Politics, Pop Culture, and the Struggle for the Soul of a Movement* (Boston, MA: Beacon Press).

### Music references

- Carter, S. [Jay-Z] (2002) All around the world. *Blueprint 2: The Gift and the Curse* [CD] (New York: Rocafella Records).
- Carter, S. [Jay-Z] (2005) Advantage Carter. *S. Carter Mixtape* [CD] (New York: Rocafella Records).
- Clayton, G. and Mutulu, O. [Dead Prez] (2000) They schools. *Lets Get Free* [CD] (New York: Loud Records).
- Jackson, C. [50 Cent] (2003) If I can’t. *Get Rich or Die Tryin’* [CD] (Santa Monica, CA: Shady/Interscope).
- Jackson, J. D. [Fabolous] (2004) In my hood. *Real Talk* [CD] (New York: Desert Storm/Atlantic Records).



- Jones, J. G. [Jim Jones] (2005) My diary. *Harlem: Diary of a Summer* [CD] (New York: Diplomat Records).
- Jones, N. [Nas] (2004) These are our heroes. *Street Disciple* [CD] (New York: Columbia Records).
- Smith, D. T. [Mos Def] (1999) Sunshine. *Black on Both Sides* [CD] (New York: Diplomat Records).
- Smith, D. T. and Green, T. K. [Black Star] (1998) Definition. *Mos Def and Talib Kweli are Black Star* [CD] (New York: Rawkus Records).
- Wallace, C. [Notorious B.I.G.] (1994) Juicy. *Ready to Die* [CD] (New York: Rawkus Records).
- West, K. (2004a) School spirit. *College Dropout* [CD] (New York: Rocafella/Def Jam Records).
- West, K. (2004b) We don't care. *College Dropout* [CD] (New York: Rocafella/Def Jam Records).
- West, K. (2007) Can't tell me nothin'. *Graduation* [CD] (New York: Rocafella/Def Jam Records).

Copyright of Journal of Curriculum Studies is the property of Routledge and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.