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Literacy and Music in Early Childhood: Multimodal Learning and Design

Michelle M. Tomlinson[1]

Abstract

This review of literature examines relevant research that supports new ways of viewing children as active transmitters of culture in situated learning contexts, where case studies explore children's redesign of semiotic modes of music and verbal linguistics. Some recent research discussed in this article supports the premise that cognitive abilities of children in early learning settings may be transformed through embodied ways of representing prior knowledge. Young children have been observed enriching prior knowledge during interactions in music invention, using the gestural mode to interpret rhythmic and melodic motifs, structure and phrasing through movement to music, or extending these elements of music (audio mode) in invented song or instrumental play. In engaging literacy tasks, they co-construct texts by drawing on semiotic resources of visual symbols and spatial design elements in written linguistic modes. This cognitive structuring is also revealed in the underlying patterns found in their embodied music invention. How knowledge is represented is crucial to children's apprehension of knowledge through co-construction. It enables their selection of media and mode for redesign, to promote their understanding of concepts and facilitate problem solving. Multimodal redesign in young children's music and verbal linguistics is explored as a rich source for communicating meaning and developing higher thinking.

Keywords

multimodal literacy, social semiotics, early childhood education, creativity and flow, music education

Children's experiences and skills in music and literacy text redesign are brought to early learning settings, and merit further investigation as to how children learn through semiotics (signifiers, or their ways of representing thought), particularly the semiotics of music (West, 2009). According to Bowman (2002), children transform their ways of knowing, their music learning identities, through music improvisation. He advocates music experiences in learning contexts that expand opportunities for more creative tasks, and further links to home and community. Such provision acknowledges the complexity, inquisitiveness, and resourcefulness of young children's inventive music practices.

Motivated by interest, children are known to make selections of vocal sound resources and reorganize these in the audio linguistic mode. This is known as invented song (Barrett, 2009; Custodero, 2006). They also substitute specific concrete speech actions with abstractions such as sounds and non-verbal processes (Kress, 2010; Mavers, 2011). Visual symbols and spatial design elements have also become recognized as important representational and communicational resources in the written linguistic mode. Through investigation of the relationship between image, writing, action, and layout, image and layout have become increasingly meshed as modal ensembles of design that shape content of literature (Kress & Bezemer, 2007). As part of this multimodal ensemble of meaning making,

sound significantly shapes the communicational landscape of children. While exploring potentials of sound to convey meaning, they develop conceptual understanding in music. This is not just evident in audio linguistics of shared and invented song in early childhood settings. Selecting elements of music and featuring some, children make decisions based on movement vocabulary and play potentials of instruments such as Orff xylophones to create accumulative sequences of sound (Young, 2003). In transformative music invention, they are agentive in redesigning or reordering elements of music, knowing when to focus on phrasing, dynamics, melody, or rhythm, similar to the linguistic concept of turn taking (Tomlinson, 2012). These young children are problem solving.

Communicating Text and Context: Social Semiotics and Multimodality

Children's text making is evident in their verbal recounts of prior experiences. It is also apparent in music activities

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where they select available instruments, and their affordances (range of pitch and/or potential rhythmic and tonal qualities), to invent new sounds that convey meaning. The range of responses children demonstrate during inventive music making, listening, and valuing can be connected to their sociocultural experiences, and this is known as music praxis (Silverman, Davis, & Elliott, 2013). Literacy has been examined as a social and cultural practice in family life (Cairney, 2003), and researchers now view children's acquisition of literacy, their text-making practices, through an active engagement in their social and cultural worlds (Flückiger, 2006). It is recognized that learning occurs informally from an early age: children progress from unconventional to conventional literacy practices over time (Yaden, Rowe, & MacGillivray, 1999). Within early childhood learning programs, there is a need to plan for creative music invention tasks that support children by validating their experiences and competencies, their cultural dispositions and identities (Barrett, 2009; Jorgensen, 2002). Children's dispositional and creative approaches to learning, their transformation of prior knowledge, and an enriched conceptual understanding should emerge through study of a variety of multimodal redesigns in music invention and literacy in early learning settings. If such tasks are approached through play-based learning and investigations in context, children will be intrinsically motivated to apply imagination and organizational skills, building on musical ideas, co-constructing music, negotiating new ideas, and developing confidence in their ownership and expression of music (Tomlinson, 2011, 2012; Young, 2003, 2009, 2010).

Active interaction in education engages essential learning processes through complex, authentic communication (Kempe, 2010; Kress & van Leeuwen, 2001). Sometimes an educator's ways of presenting knowledge may not align with children's communicative modes, and comprehension is weakened. Kempe (2010) proposes an alternative metaphor that views communication as "interconnected networks of nodes in a rhizomorph (mushroom) structure, where any point connects to any other point in a weave-like pattern that brings different regimes of signs into play." Dualist oppositions of mind and body may be drawn together through embodied texts. Children embody thoughts using semiotic resources, signs that enrich knowledge and realize identities (Kress, 2010). This metaphor is appropriate for children's thinking, likened to being without beginning or end, always in the middle, in between things (Deleuze & Guattari, 2011). It shifts the emphasis from the educator to the child.

Multimodal social semiotics focuses on situated social and material resources through which meaning is made. These materials and modes (verbal linguistics, audio, gestural and spatial relations, mimetic or technological, and visual modes) are ways to use culturally available resources based on children's interests to assist in communication of meaning. Children negotiate their own identities and pathways by remaking texts and representations (Jewitt, 2009).

They participate in learning processes by capturing through texts "the essence of the alterations, transformations, re-makings of social arrangements and practices" (Kress, 2010, p. 10). Children constantly use representations—ways of framing an aspect of their world—throughout the learning process. Drawings, verbal linguistic communication, pauses, gesture, videos and music, as well as written texts are examples of these representations. Children use them to explore and make meaning of their world, to frame it, to discuss ideas, and to reflect on what they have learned.

Whereas linguists have treated language as one integrated phenomenon, "attention to the *materiality* and *logics* of modes, to their distinct and specific *affordances*, suggests that *speech* and *writing* need to be treated as distinct modes, rather than as superficially differing variants of the one mode of 'language'" (Kress, 2010, p. 105). Modal affordances are the meaning potentials or possibilities, representations or materials that make meaning of the text, the social aspects of design, and the connection between the two. Affordance is that which the sign can potentially convey. Affordance refers to the potentials of modes (or ways of expressing knowledge) and the limitations of that mode. This applies to music and language as modes: each conveys meaning but has limitations as partial representations of a reality (West, 2009). Redesigning modes in texts makes it possible to convey an indication or embodiment of realism. Redesign may apply to our existence in the world, or address significant problems in the specific social environments for which they were designed (Jewitt, 2008). Materiality of modes facilitates redesign in local and global contexts.

Skaar (2009) has written a defense of writing as a mode, comparing it with digital technology, the combination of image and text as modes in representing children's learning. He concludes that technology as a mode allows children to "opt out" of and avoid semiotic work of writing (which he equates with learning) because children, while making choice of words or image, do not always attend to syntagmatic combinations of words or choices made using "contrasts and combinations on different structural levels" (Skaar, 2009, p. 39). He argues that the blending of different modes "makes it easier" for children to communicate their experiences to make meaning, but that resistance, as a premise for learning, engages children in the performance of true semiotic work in the form of writing to communicate meanings. While the importance and pedagogical benefits of making written texts is undeniable in contributing to learning, children's ability to make transformations in understanding, digital technology has highlighted the ability to think of other ways to create texts and redesign meaning. There is opportunity to navigate many pathways to synthesize ideas and shape the learning process.

This shaping of meaning using situated or available resources is known as the metaphor of mobility, useful in describing children's learning in today's world. "Mobile technologies or mobile learning . . . captures the essence of

the alterations, transformations, re-makings of social arrangements and practices" (Kress, 2010, p. 6). Signs of learning occurring in children's lives are more accurately observed and understood through the *multimodal* lens: the differences in the capacities of the learner in making signs as a result of learning (Jewitt, Kress, Ogborn, & Tsatsarelis, 2001). Signs are made in circumstances of the time and are entirely motivated by the interests of the maker (Kress, 2010). What is learned is entirely different from the child's representations or signs of learning. There is a *transduction* process where the child deletes most of what is there in the information or the experience, but signifies the essential meanings. How knowledge is represented becomes crucial to a child's apprehension of it through transformational redesign of resources specific to the task at hand.

> Learning is the result of the transformative engagement with an aspect of the world which is the focus of attention by an individual, on the basis of principles brought by him or her to that engagement, leading to a transformation of the individual's semiotic/conceptual resources. (Kress, 2010, p. 182)

Multimodal discourse analysis (Norris, 2009) is a useful way to observe and analyze learning occurring in children's mediated literacy and music representations, particularly by identifying modal redesign. Observations of children's music making are made more useful by exploring the modes at work during interaction. Not only does the teacher/researcher look at spatial, gestural, mimetic (technological), and spoken modes but also focuses on music modes, the elements of music. Through video transcripts and analysis of children's composing events, modal alignment is seen to occur at certain points in the activity. This often indicates a transformation of children's knowledge, particularly where children combine two or more music modes (rhythm and melody; harmony, or tonal qualities of instruments), redesigning them to shift the meaning while communicating in invented song, playing instruments, reworking technological recordings of pop songs, or responding with movement. There may also be moments where children feature one mode to elaborate on that conceptual element and emphasize a particular meaning (Bezemer & Mavers, 2011; Flewitt, 2006). Use of social semiotic analysis facilitates the educator's understanding of children's communication as they use culturally acquired and readily available resources to master different modes for representing the world. This furthers the understanding of the richness and complexity of semiotic modes and how they can be integrated in communication and learning experiences (van Leeuwen, 2005). Issues of difference and belonging are reconfigured to accommodate past memories, places, and learning while affirming a sense of connectedness with new learning communities (John-Steiner, 2006). Modes are a means of learning and an expression of community.

In a future where diversity is the only possibility for any community, including that of First Australians, music and literacy learning must be grounded in multicultural human subjectivity (Marsh, 2011). Inclusivity reaches beyond performance goals, methods of instruction, and professional products. Music is a diverse practice, engaging children as they redesign texts or improvise, for through this experience they develop self-understanding (Custodero, 2009). Musical knowledge is largely informally acquired through the ability to reflect critically in action, knowing when and how to exercise musical judgments, and most importantly, knowing the musical context and drawing on situated traditions of practice and listening skills for depth of understanding (Bereiter & Scardamalia, 2005). Creative music learning occurs when children make musical decisions while performing (Reimer, 1985). Music learning becomes a way to "help students encounter their own conditions of alterity and transform what they imagine their identity imperatives to be" (Bradley, 2008, p. 133). It is the development of musicianship or musical understanding, "the construction of successive and simultaneous musical sound patterns—to vary, transform and abstract them" (Elliott, 1995, p. 54). This is semiotic practice. Elliott (2012) viewed music as artistically combining many convergent and divergent forms of thinking, engaging the person's entire identity and consciousness: attention, cognition, emotion, intention and memory, in social and cultural contexts.

Music making particularly enhances cognitive skills, according to research in children's composing processes (Wiggins & Espeland, 2012). Their music processes are ways to explore expressive, communicative qualities of music modes. These conceptual elements of music become tools for co-constructing a musical whole during group interaction. Examining the role played by critical thinking is seen as important when considering children's compositions and creative music making (Kerchner & Abril, 2009). Focus on children's creativity in improvisation helps to understand how music assists children to actively co-construct semiotic resources to communicate, and enhance their identity and self-understanding in relation to others, rather than honing listening and performance skills alone (Harrop-Allin, 2010). Research also maps children's composing with computers (Seddon & O'Neill, 2001).

Learning that engages young children necessitates a *forward-looking* model of practice that is inclusive of technology. Learning is not always shaped by pre-determined factors: structures, resources, participants, and environments. It takes place in a continuum, irrespective of circumstances (Ivarsson, Linderoth, & Säljö, 2009). The situated sociocultural perspective is a crucial approach to research on communication, when linked to theories of human development and learning (Ivarsson et al., 2009). Learning in the 21st century is prospective, based on design, the social semiotic approach of meaning making, and communication in the present (the now) in relation to likely future effects of these actions (Kress, 2010). The mimetic (technological) mode is a forward-looking mode of communication. Children have

been observed taking readily available material (such as a melody from an iPhone ringtone), adding lyrics and movement, and extending the melody to communicate in fresh and fun-filled ways (Tomlinson, 2013). Using MP3 players or iTune application and earphones, they have been recorded singing counter-melodies to a favorite melody, freely inventing harmonic and melodic counterpoint (Tomlinson, 2013). They have used music technology programs such as Sibelius, to build on loops by selecting rhythmic, melodic, and dynamic elements, and timbral qualities of instruments, composing by redesign of *music modes as elements of music.* The mimetic mode can expand children's world of music invention in early years.

Fast and multifaceted processes required by learning in more than one mode challenges children to make many lightning transformations when redesigning texts, giving then a "big picture" perspective on cross-cultural problems and ways to solve them (Scollon & Scollon, 2001). Immediate choices require immediate decision-making and reasoning skills. The social semiotic learning theory views the child engaged in sociopolitical processes of decision-making, co-constructed peer interaction in literacy composing practices, and music invention. "Representational meaning (experiential meaning) is meaning concerned with the construal of material or mental experience—the processes, participants and circumstances involved" (Jewitt, 2009, p. 303). Representations, or modes, are the outcome of a cultural shaping of a material (Jewitt, 2009). Children remake their learning identity and transform conceptual understanding by selecting modes for redesign in new representations, new texts (Mavers, 2011). They negotiate their pathways, cultures, and identities by redesigning knowledge in new contexts (Kjallander, 2010).

Creativity and Flow in Learning

Investigations of interactive and embodied learning through multimodal redesign assist in determining how children make transformations in their conceptual understanding, and how this is linked to higher mental functioning (Tomlinson, 2012). "There must be further account relating thinking and logic to objective and inter-subjectively accessible thought" (Smith, Dockrell, & Tomlinson, 1997, p. 8). Dewey (1934) reasoned that the development of thinking and logic among children in a learning community occurred when children participated in an environment that encouraged learning through interaction. He saw intensified engagement as a sign of learning. Acknowledgement of the significance of children engaged in learning was the basis of Csikszentmihalyi's (1990) theory of *flow* as a heightened form of connection in thinking and communication. This occurred when children experienced collaborative, deep enjoyment of activities. They experienced merging of action and awareness, deeply concentrated and in control of their actions and environment. Massimini and Carli (1988) systematically assessed intense

interactions in everyday experiences with perceived challenge, finding that in repeated group activities, engagement led to an optimal sense of flow after 8 of 10 interactions. Skill increased with repeated exposure to the activity, and more complex interactions.

Ongoing studies of culturally diverse children, which capture their enactment of higher thinking through modal redesign, are necessary to understand co-constructed learning processes and how these are inextricably linked to creative music activity (Tomlinson, 2012). "The relation between creativity and intelligence is an open research question, worthy of consideration" (Sternberg & O'Hara, 1999, p. 262). Haensly and Reynolds (1989) concluded that creativity and intelligence are a conjoint set, and creativity is an expression of intelligence. However, Weisberg (1999) does not discriminate creative and non-creative individuals except in the knowledge they possess. Feist (1999) recognized children's creative ability and redesign of semiotic resources as a better predictor of later creative achievement than intellectual ability. "Creativity is fluency, flexibility, usefulness and originality of association, not speed at solving verbal or mathematical multiple-choice problems" (Feist, 1999, p. 287).

Creativity in learning activities is acknowledged as important for the development of cognitive transformation in learning. Three intellectual abilities (Sternberg, 1985) are seen as uniformly indicative of creative ability. They are synthetic ability (ability to see problems in new and unconventional ways), analytical ability (recognition of ideas that are worth pursuing), and practical contextual ability (how one persuades others of the worth of one's ideas; Sternberg, 1985). Seminal research on personal attributes for creative functioning indicated the possession of self-efficacy, tolerance of ambiguity, risk taking, and overcoming of obstacles (Sternberg & Lubart, 1995). Research suggests complex reasoning as a basis for creative thought (Jalongo, 2003).

From the earliest experiences of music in educational settings, planning is needed for creative music invention that supports children's learning by validating their prior experiences and competencies, their dispositions, and music identities (Barrett, 2007). Situated musical activity with primary caregivers enhances development from a very early age (Trevarthen & Malloch, 2000; Young, 2002). Through real-life investigations of sounds and elements of music in the classroom, children are intrinsically motivated to apply organizational skills to evaluate, negotiate, and redesign modes; select music elements, to co-construct fresh music; and be confident in their ownership and expression of music (Tomlinson, 2011). Creative meaning making and active engagement with people and materials is fundamental to play according to The Australian Early Years Learning Framework (EYLF, 2009). Play is also a component of learning expressed in "making" and "responding" in the Draft Australian Curriculum: The Arts (Australian Curriculum, Assessment and Reporting Authority, 2012). In Australia's national curriculum, play-based learning "fosters imagination, discovery

and inventive practices" in groups that "challenge each others' thinking and develop new understandings" (EYLF, 2009, p. 70).

Dispositions and Music Invention: Modal Redesign of Literacy and Music Texts

Children's collaborative activities that challenged prior knowledge and dispositional competencies were not always accepted in early learning settings. Bourdieu (1972) wrote a series of works that started with the premise that children's dispositions were culturally informed and largely unaltered. He considered the possibility of children being confronted with new conflicts, new challenges that caused transformations in dispositions. In Bourdieu's view, *habitus* refers to similar or identical forms of behavior, for example, those which occur in a family, and which are approved or symbolically rewarded. Bourdieu defined *habitus* as a system of dispositions, "the result of an organising action . . . combined with a manner of being, a habitual state [especially of the body], and, in particular, a *predisposition*, tendency, *propensity or inclination*" (Bourdieu, 1972, 1, p. 247). He clarified this view by adding "The habitus is necessity internalised and converted into a disposition which generates meaningful practices and meaning-given perceptions . . . and which carries out a systematic, universal application - beyond the limits of what has been directly learnt" (Bourdieu, 1994, p. 170).

In Bourdieu's view, both the social and the cultural space guarantees reproduction of that space (symbolic practices that maintain social and cultural capital) unless there are contradictions and conflicts. If, *through new conflicts or generative tensions*, there are transformations of these practices in the field, then transformations of dispositions can occur. Through internalized, meaningful practices, or cognitive structuring that combines modes in situated experiences, the individual makes sense of new knowledge, adapting to change. More recent thinking, supported by case studies of children in cross-cultural learning environments, affirms that children's contribution to change is also directly linked to "the degree of participation afforded them by adults and their own choices to enact agency" (Flückiger, 2006, p. 255).

Children exercise judgment and evaluate learning experiences, and interact purposefully in social contexts, demonstrating higher mental functions (Bargh & Ferguson, 2000). Other case studies from a sociocognitive perspective focus on children as having agency and self-determination, engaging principles and values by applying knowledge and making judgments to create literacy texts (Pufall & Unsworth, 2004). Bourdieu (1990) commented on the process of discovery through practical reason, within the framework of the body, which translated knowledge into action in a fluid process, an improvisation of discourse. Knowledge was transformed through enacted belief, practices based on common

sense (Bourdieu, 1990, pp. 68-69). Inseparable from identity, it was an ever-changing orientation to new knowledge.

Music invention is an embodied process of translating knowledge into action, and expression of music disposition (Elliott, 2012). It is "not anything like capricious, hastily thrown together. Rather, it points to the skilful making of numerous decisions and developing their implications 'on the fly,' in the midst of ever-changing circumstances. To improvise is to act without absolute foreknowledge" (Bowman, 2002, p. 81). Bowman (2002) perceived that children use embodied means to translate cognition into musical activities. He noted how children's thinking is shaped in music activities through "independence . . . curiosity, flexibility and experimental-mindedness" (Bowman, 2002, p. 75). Embodiment extends beyond the bounds of practical reason to the whole approach of meaning making and the imagination (Lakoff & Johnson, 1999). In music education, Bowman (2002) advocated methods of teaching that "foreground 'betweenness' and nurture attitudes of practical judgement" (p. 74). Quality classroom experiences of music invention are embodied ways of understanding because they include transformational redesign of music in gestural mode, when moving to and interpreting music; in audio mode when co-constructing soundscapes; redesigning storybook to instrumental ensemble or invented song; and when accessing linguistic and gestural modes using words and movement in a speech rap. "Inclusion of music invention empowers children to stretch their text-making ability and to transform texts in new situations over time" (Tomlinson, 2013, p. 371).

It is now generally believed that learning dispositions can be transformed moment-by-moment through tensions in literacy practice (Pufall & Unsworth, 2004) and music (West, 2009) which require children to make meaning of new experiences and form new knowledge, new creations. Identity is not given, but created (Butler, 1990). If music is made sufficiently complex and relevant, it provides children opportunities to exercise choice and dispositional ways of thinking, expressed through embodied modes as ways of knowing in everyday experiences (West, 2009). Research is needed to further explore children's musical activity and negotiating ability (Barrett, 2009). This includes research on children's use of semiotic resources in situated literacies and music practices (Harrop-Allin, 2010). Selections of instruments, movement, singing, and other affordances assist children to enact agency and transform prior knowledge through modal redesign, realizing new understanding (Tomlinson, 2012). They problem solve by selections and combinations of modes.

Embodied learning assists in enacting agency and choice, the "notion of education as the formation of subjectivity and character" (deCastell & Jenson, 2010). Such practice enhances children's learning by supporting children's unique identities, choices, and competencies. Specifically it reveals how, in creating literacy texts, children select materials and modes and redesign them in a deliberate and

principled manner, limiting themselves to what is essential to convey meaning (Mavers, 2011). Music invention also involves music redesign: children draw on epistemic, embodied rather than textual fields of knowledge. Enriched learning is developed over time as learners redesign meaning across modes over time (Harrop-Allin, 2010; Tomlinson, 2012). Meeting challenges of connecting children's life values to their activities in the classroom will promote rich learning in education. This is done by the provision of experiences with autotelic (intrinsic) rewards, as they are challenging in terms of higher functioning, where learning is connected to children's lives, their dispositions (Barrett, 2005; Green, 2005). Children's contribution to change is directly linked to "the degree of participation afforded them by adults and their own choices to enact agency" (Flückiger, 2006, p. 255). Further research is required to investigate the "importance of seeing and hearing children's perspectives, (to determine) how to embed children's voices within curricular choices" (Griffin, 2009, p. 176).

Recent Research in Early Childhood Music Education

Recent research seeks to discover more about young children's ways of co-constructing and communicating their experiences through activities in music. Some ideas of music as learning through interactive inquiry and creative meaning making have been elucidated by Jorgensen (2002). She rejected methods founded on the rational development of musical concepts, outlining perspectives of children's development emphasizing mutual discovery between children and teachers, based on different ways the child makes meaning of self in the world, and cultural constructions reflecting and reinforcing these ways of knowing (Bruner, 1986). Music for young children needs to be rich in multimodal experiences (moving, creating, playing, reflecting) to create a symbolically fluent child (Young, 2003). The learning environment should be a place filled with many modes: colors, sounds, and textures that would provide for activity-oriented musical experiences, a place where teachers enrich literacy through thoughtful discussions with children of the music they are making (Harrop-Allin, 2010). Vygotsky (1978) recognized links between social collaboration, transformative human relationships, and the development of metacognition. Children's concept of self and their world may be transformed by framing knowledge, enacting agency intuitively, developing strategies, and internalizing their knowledge (Vygotsky, 1978). Literacy is also enhanced by meaning making through song, achieved when syntax or structural elements of language are combined into sequenced phrases, making sense of a story (Singer, 2008). This is often done by the music teacher, who adds emphasis through dynamics, rhythm, the repetition of musical notes in the same pitch to align with the repetitions in the text, singing musical phrases to fit the phrases of a sentence, and adding musical effects to

bring the story to life. Self-initiated play with musical instruments develops the child's vocabulary of movement and time-space structuring such as story or narrative role-play (Young, 2003). Her observations of young children's spontaneous play on educational percussion instruments revealed that their music making was context-embedded, related to bodily movement and the position of the instrument in the space, and complex. Events and peers in the environment shaped the music and story. A significant link between pitch awareness and phonological awareness has also been established (Buldoc & Montesinos-Gelet, 2005; Tendall, 2009) that indicates music and literacy learning are closely linked.

Studying children in everyday contexts acknowledges that the everyday is a primary site for cultural participation (Chaney, 2002) and that children's spontaneous development of skills, knowledge, and identity occurs in cultural participation (Tudge, 2008), particularly their early creative work in music (Barrett, 2006, 2009). Learning occurs in many contexts, supported by primary caregivers to enhance development from an early age (Young, 2002, 2009). Young (2002) suggested that when children begin formal schooling, their musical activity remains central to motivation and cognitive development. Music should be made a key learning area, which acknowledges children's development of flow in learning, motivation, enhanced co-operation and sharing, spontaneity and confidence through music invention, and problem solving by co-constructing texts in collaborative music play. Without it, children may suffer delays in their development in other key learning areas. This view is supported by research (Barrett, 2007; Bowman, 2002; Singer, 2008).

Young (2010) identified the need for further longitudinal studies of forms of organization (repeated patterns, embellishments, melodic riffs, and note clusters) that underpin children's music making and competencies in music. Young (2003) highlighted the need for ongoing research of "intersensory whole" of music—instruments, voice, and movement—to identify "forms of organisation that are identifiable and competencies they imply, so that appropriate provision and pedagogical strategies can be designed" (Young, 2003, p. 56). Previous research had transferred adult expectations and standards onto children, where compositions were completed and defined pieces of music using conventional notation. Her case studies found the individual child's hybrid music making, however, consists of a blending of new experiences and known song forms. In response to events in the environment, a free-flowing structure and transformations of previous musical ideas occurred.

Bamberger (1991) also described music in social contexts, where learning was developmental. It involved different ways of representing musical knowledge, as children interacted with each other in a multimodal manner. Bamberger and Schön, 1991 (p. 52) noted that as children made musical representations, or modal redesigns, they created written material that "holds still." "Reflection-in-action"

is defined as "the child's ability, with assistance from the teacher, to move back and forth between reflection *of* experience and reflection *on* experience" (Bamburger & Schön, 1991, p. 52). Observed in children's behavior, they noted that inner voice, pitch, and rhythm patterns seemed to evolve with each musical hearing. As the disposition of the child evolved, musical patterning and perception changed.

Gordon (2011) referred to the child's inner voice as "audiation." Sound (rhythm and pitch) patterns were known as musical vocabulary set over repeated beat patterns. By looking at music, rather than the child's dispositional behavior, he found these basic patterns in music were representing the elements of music. He suggested that children's "encoding" was developmental. Earliest perceptions were "holistic" and grouping of patterns emerged at an older age. With growing repertoire, children stored these patterns for recall. How they grouped them remained an area of investigation. Children may respond to the elements of music with more understanding given experience, exposure, and contextualized activities and resources. This article has argued the premise that children access multimodal redesign by responding to elements of music, incorporating specific modes as resources to communicate in situated music invention: verbal linguistics, picture books (visual mode), spatial relations (the spatial mode), mimetic, and gesture (Harrop-Allin, 2010; Tomlinson, 2012). They problem solve by selecting modes to redesign and transform meaning.

Significance of Further Research

From a review of the literature, children's active engagement in music invention enhances their conceptual understanding through modal redesign, as co-construction of knowledge. This appears to promote problem solving and cognition. Further investigation in literacy and music, through video analysis, may reveal that both graphic and non-graphic (embodied) or musical texts are equally useful for learning and cognition (Kress, 2010). Significance of sociocultural contexts, how the child is situated in family and community, may be examined through observations and narrative interviews, to see how these factors contribute to a holistic experience of learning. Motivational, adaptive, and inventive behaviors may be cultivated in music invention. Further studies in modal redesign are needed to investigate this premise.

Expanding or scaffolding children's early musical experiences and investigations, their engagement in the world of sound, their transmodal redesign of known literature and song repertoire to communicate new meanings helps children establish strong, confident, vibrant, and creative identities in learning, communication, and performance. Further research may empower teachers to use multimodal video analysis (Flewitt, 2006; Norris, 2009), observation, and narrative interviews, to reveal the unique capacities of each child to redesign semiotic resources to promote cultural understandings. The findings will be useful in implementing effective teaching strategies to promote children's multimodal co-construction and communication.

Conclusion

Recent research recognizes the need for greater understanding of children's redesign in music and literacy. The necessity of connecting curricula to children's lives, and their enactment of agency, has been promoted through narrative studies (Barrett, 2005; Green, 2005). Further research is required to emphasize the "importance of seeing and hearing children's perspectives [and determining] how to embed children's voices within curricular choices" (Griffin, 2009, p. 176). In particular, how young children communicate their experiences and ways of knowing through multimodal redesign in music and literacy calls for further study, for little is known (Harrop-Allin, 2010; West, 2009). Literacy as a social and cultural activity empowers children to negotiate their own pathways by remaking texts (Jewitt, 2009).

Research developing visual methodology and multimodal analysis, focusing on children's music invention and linguistic text compositions with a narrow lens and thick description, over time, can promote understanding of children's music and literacy. Exploring young children's transformational redesign of texts, using a social semiotic lens, reveals their metacognition and purposeful design strategies when they co-construct meaning in music and literacy, in situated settings. How these processes evolve and change over time are interesting questions for further investigation.

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