A Qualitative Investigation of Early Childhood Teachers' Experiences of Rhythm as Pedagogy

ARTICLE *in* JOURNAL OF EARLY CHILDHOOD RESEARCH · APRIL 2014

DOI: 10.1177/1476718X14523745

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Journal of Early Childhood Research published online 9 April 2014
DOI: 10.1177/1476718X14523745

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1–15

DOI: 10.1177/1476718X14523745
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A qualitative investigation of early childhood teachers' experiences of rhythm as pedagogy

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Abstract

Rhythm has been found to enhance not only biological functioning (e.g. balance, timing and coordination), but also to facilitate learning across sociocultural contexts. That is, rhythm may be a method of supporting child development and well-being. Hence, to the extent that children are not exposed to or engaged with rhythm, their development or the realization of their full potential may be limited. However, little research has explored the use of rhythm in early childhood education—a major context (in terms of time and importance) of children's lives—or teachers' experiences with rhythm in their pedagogy. Therefore, we conducted a qualitative study to investigate elementary teachers' experiences of rhythm in their classroom teaching specifically, and in the teaching–learning process generally. A phenomenological approach that assumes that peoples' perceptions present us with evidence of the world not as the world is thought to be but as it is lived was employed. Our goal was to understand the everyday pedagogy of a group of elementary school teachers, specifically, to understand how *they* experienced and constructed the role of rhythm in elementary education. Semi-structured qualitative interviews were conducted with study participants to probe and generate a rich description of the phenomenon of rhythm in the teaching–learning process. Results consisted of nine themes that convey (1) what rhythm meant to the teachers, (2) what they saw as the importance of rhythm in their teaching, and (3) the challenges they faced in incorporating rhythm in their teaching. Findings suggest that a broader and more inclusive range of activities (i.e. because rhythmic activities such as music, dance, oral rhymes, and other bodily movement) in the academic curriculum is important as such activities have the potential to improve the learning, development, and well-being of elementary school-age children and enhance the lived experiences of schooling for both educators and their students. However, a number of challenges also confront elementary educators who seek to incorporate rhythm into their pedagogy.

Keywords

children, developmental, experiences, pedagogy, phenomenology, qualitative, rhythm, teachers

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Introduction

Whether recognized or not, rhythm is an integral component of human development and learning (Bruns and Pierce, 2007; David et al., 2007; Gardner, 1993; Hansen et al., 2004; Mehta and Stakiw, 2004; Peebles, 2007; Perret and Fox, 2006; Wolfe, 2010). In educational contexts, humans communicate by learning to speak words and numbers orally in rhythmical patterns of varying tempos and tones. Humans also use *body* language and music in rhythmical ways to convey a variety of mimetic, kinesthetic, and tactile forms of information. According to Wolfe (2010),

> We tend to think of music only in cultural or artistic terms, but scientists have found that music is a highly complex neural activity. Sound waves enter our ears and are converted into nerve impulses by the Organ of Corti in the cochlea. From there, the impulses are transmitted to specialized regions in our left and right temporal lobes for processing … For us to make sense of the music, the signals must travel from the temporal lobes to working memory in the frontal lobes. (pp. 160–161)

Furthermore, two decades ago, Gardner's (1993) work on multiple intelligences indicated that one of the eight ways of knowing involves musical rhythmical intelligence. Musical rhythmical intelligence is an ability to recognize, use, and understand the signs, symbols, and patterns of rhythm and music, namely time signature, key signature, and musical notation. Armstrong (2003) suggested that

> … multiple intelligence theory serves as an important impetus toward fundamental reforms of our educational system, leading to a reevaluation of those subjects typically taught in school, with increased emphasis placed on the arts, nature, physical culture, and other topics traditionally limited to the periphery of the curriculum. (p. 4)

Applying Gardner's ideas to the field of health education, Ubbes (2008) contended that rhythm is a key element in teaching and learning about health. She further advised that

> As you educate for health, the more you can integrate a variety of symbol systems (e.g., words, pictures, numbers, body language, rhythms, and environmental cues), the deeper and more well-rounded your students will become in their understanding and meaning making … When young people actively design or implement these different language elements through active engagement—instead of passively receiving health messages—there is greater potential for learning. (p. 96)

Ubbes' contentions are supported by the research of Perret and Fox (2006) who found that when people discover a rhythmic component to certain tasks, they can learn them better through coordination of movement, sequencing, and patterning. In their research on the use of music to help children listen and learn, they observed that "… timing [rhythm] is critical to many of our mental and physical activities" (p. 108). They also asserted "… people discover for themselves that adding a rhythmic component to certain tasks helps them do better" (p. 108), and that rhythm and timing relate to academic achievement, cognitive function, and coordination of movement.

Several researchers have found connections between rhythm and reading success. David et al. (2007) contended that rhythm can predict "significant variance in reading ability at each grade level" and that "rhythm is an important part of language, becoming salient almost from birth" (p. 170). Bruns and Pierce (2007) also stated, "… arts related activities (e.g. music and movement, painting) are … avenues for young children to acquire print and literacy skills" (p. 3).

Taub and Lazarus (2012) provide one of the more compelling arguments for the role of rhythm on reading achievement with the results of their study of 280 high-school-age participants who completed a pre- and post-test assessment from the Woodcock-Johnson Tests of Achievement III

(Woodcock et al., 2001). Building on Wolff's (2002) research, documenting reading performance differences of students with and without dyslexia, Taub and Lazarus had students in a control group participate in traditional classroom activities while an experimental group participated in a timing/rhythm intervention of step testing to a reoccurring metronome beat. The experimental group's post-test scores on the Broad Reading and Fluency test were significantly higher than the non-treatment control group's post-test scores. Taub and Lazarus (2012) concluded that,

> Students experiencing deficits in timing/rhythmicity are often poor readers. In fact, many students with these deficits have a learning disability in reading. Perhaps significantly improving a student's skill in timing/rhythmicity, may have the effect of reducing the impact of reading disabilities of handicapping readers and improving the fluency and broad reading skills of typical readers. (p. 348)

Clearly, the extant research documents the importance of rhythm to children's development, and suggests the use of rhythm as a pedagogical strategy—that is, as a facilitator of children's learning. However, no research has examined *educators'* perceptions and experiences of rhythm in relation to the teaching–learning process and to children's learning and development. Yet, understanding the experiences of educators is important if rhythm is to be integrated into the pedagogy of a classroom. Hence, this study explored if and how elementary school teachers use rhythm when teaching their students, the meanings they make of rhythm experiences in the teaching–learning process, and the outcomes and challenges they have experienced in using rhythm in their pedagogy. By exploring educators' use of rhythm for student learning and their experiences of rhythm in their teaching, we hope to better understand how rhythm may be incorporated into classroom teaching and thus enhance children's learning and development.

Genesis of the study

This study emerged from a series of discussions regarding the role that rhythm-based activities like music, art, dance, movement, and play may have in learning while the first and second authors (D.R.M. and V.A.U.) were working on an evaluation project in an elementary school in rural southwest Ohio. This school was piloting a locally adapted program called *Brain Maze* that was inspired by Candace Meyer's work (Meyer, 2012) and her *Minds-in-Motion* (2012) program. The elementary teachers had made a school-wide commitment to incorporating physical movement patterns into their teaching. For example, most teachers used physical activity breaks in their classroom whenever their students transitioned to a new subject or academic task. The *Brain Maze* program involved all teachers taking their students through a 15-to-20-minute sensory motor circuit throughout the school hallways each day. The physical activities focused on dynamic balance (i.e. equilibrium), basic motor skills (e.g. hopping, jumping, turning, and walking backward and sideways), and eye–hand coordination through juggling and eye-tracking activities. This spurred our interest in what research had found about the role of rhythm in the teaching–learning process. However, we discovered a paucity of research on rhythm *as pedagogy* generally, and how teachers thought about or made sense of rhythm as pedagogy specifically. Given this lack *and* what we observed in the school during our evaluation project, we developed a research proposal to specifically explore the topic of rhythm in elementary school education.

Research approach

Our primary research question—What are public elementary school educators' perceptions and experiences of rhythm in their classroom teaching specifically, and in the teaching–learning

process generally?—was explored through a qualitative interview study. Qualitative research is a "systematic empirical inquiry into meaning" (Shank, 2006: 5) that includes a planned or orderly exploration of how individuals make meaning or sense of social phenomena. Qualitative researchers examine social phenomena in their natural setting and seek to illuminate phenomena that may otherwise go unnoticed.

The specific qualitative research approach that informed this study is phenomenology. Phenomenology assumes that human behavior occurs and is understandable only in the context of relationships among things, people, events, and situations (Schram, 2003). A phenomenological approach also assumes that perceptions present us with evidence of the world not as the world is thought to be, but as it is lived. Thus, understanding the everyday life of a group of people is a matter of understanding how those people perceive and act upon objects of experience. Furthermore, the reality of anything is not "out there" in an objective or detached sense but is inextricably tied to one's consciousness of it. Hence, in this study, we explored educators' understandings of rhythm—their consciousness of rhythm and what it means to them as a teaching–learning strategy—through in-depth face-to-face interviews.

This study was also informed by a *critical* lens (Schram, 2003). That is, the study not only sought to make sense of the way things are based on the experiences of the participants, but also to raise questions about, and perhaps even change, the way things are (Creswell, 2007). That is, part of the impetus for this study was to question the teaching–learning process and to explore other possibilities for how education is provided and practiced. Hopefully, the insights provided by this study will provide for a broader and more inclusive range of activities in the academic curriculum that allow every child to learn and develop, thus enhancing the experience of schooling for, and the well-being of, both educators and students.

Procedures

Sampling

Once Institutional Review Board approval for the proposed research was received, the principal at the elementary school where D.R.M. and V.A.U. had previously conducted an evaluation study was asked for permission to conduct the rhythm study at her school. After the principal gave permission for D.R.M. to conduct the study at her school, teachers were invited to participate. Hence, the *sampling universe* for the study (Mason, 2002) was kindergarten through fifth-grade teachers in the public elementary school described above. Specifically, the educators who participated in this study comprised an *illustrative* sample, a form of what Mason (2002) describes as *strategic sampling*. The idea here is not that the sample is directly representative of some larger universe or population but rather that it provides a relevant range of that universe. Participants in this study were an illustrative sample because they were individuals who taught in a school with structured curriculum time for rhythmic activities (i.e. physical movement) via the Brain Maze, and thus were individuals able to talk about the phenomenon of interest—rhythm in the teaching–learning process.

Educators were sampled until *theory saturation* was reached; that is, until the essence of the social phenomenon "rhythm in the classroom" could be described and explained (Mason, 2002). This required interviews with 10 elementary school educators.

Description of study participants

Study participants were elementary school educators in rural southwest Ohio, and included eight women and two men with a mean age of 48.6 years. All were European-American. Years

of elementary school teaching ranged from 1 to over 24. Six teachers were specialists in early childhood education, and the four other teachers were each a specialist in music, art, reading, or physical education. Six had completed a 4-year degree while four had also completed master's degrees.

The interviews

An Interview Guide was developed and used in this study. Interview questions were designed to explore the study's research question and followed standard protocols for the structure and process of semi-structured qualitative interviews. Specifically, as noted by Spradley (1979), qualitative interviews typically begin with a *grand tour* question that seeks to open up communication and set the stage for more detailed questions later on. Then "mini-tour" questions are used to ask interviewees to focus and provide further details on and insights into their experiences of the phenomenon of interest.

While taking a class with the third author (V.J.F.) on qualitative research methods, D.R.M. developed and piloted the Interview Guide with two public school teachers. Subsequently, slight modifications were made in the wording and order of a couple of the questions to improve their clarity and facilitate the "flow" of the interview. However, as a "conversation with a purpose" (Mason, 2002), qualitative interviews by intent are designed to be flexible and responsive to the unfolding interaction between the interviewer and interviewee. Still, an Interview Guide serves as reminder of the topics and issues to be explored during the interview.

After a specific day for conducting each interview was identified, study participants were sent email reminders the day before their interview to confirm the scheduled meeting time. Interviews were conducted individually in a quiet, private room at the school; following standard human subjects protocol and audio-recorded (i.e., rights of participants were explained and informed consent was obtained).

In this study, each interviewee was asked to begin by telling his or her "story" about his or her experiences and perceptions of teaching and learning generally. If the topic of rhythm was not already raised in the interviewee's story, *mini-tour* questions subsequently asked educators to talk about how they thought about rhythm; whether they use any rhythm-based activities or experiences in their classrooms, how so, and why or why not; and what they saw as the outcomes and challenges of using rhythm in their pedagogy. Throughout the interview, probing or follow-up questions were also asked in order to explore and come to understand the meanings of rhythm in classroom teaching and learning as constructed by each interviewee. When the topics that were part of the Interview Guide were addressed, and it appeared that the interview was coming to an end, the interviewee was asked if there was anything else that he or she could say about his or her perceptions and experiences of rhythm in teaching and learning that he or she had not yet had an opportunity to say. Then, the study participant was debriefed regarding the purpose of the study.

Immediately after each interview, the interviewer made notes describing his impressions and thoughts about the process and content of the interview itself as well as aspects of the interview that was not audio-recorded such as mood and setting. Throughout this study, the primary investigator (D.R.M.) also engaged in reflexivity or critical self-reflection, the process of recognizing and acknowledging one's beliefs and assumptions about the phenomenon being studied (Johnson, 1997; Schram, 2003). In practicing reflexivity, the primary investigator sought to recognize and "bracket" the influence that his beliefs and assumptions might have on the study so as to allow participants' meaning-making to be heard.

Analysis

Data analysis in qualitative research begins during the interview as initial "meanings" are identified and then explored in subsequent interviews. Mason (2002) emphasizes that data analysis is an ongoing and iterative process. As the researcher who conducted the interviews, D.R.M. engaged in this process, and once all interviews were conducted, transcribed them verbatim. Then *researcher triangulation* (Johnson, 1997) was used; that is, along with D.R.M., the co-authors of this study each independently read and re-read each interview transcription and marked any "slice" of data that answered the question of this study: What are public elementary school educators' perceptions and experiences of rhythm in the teaching–learning process generally and in their classroom teaching, specifically? After this initial coding of the interviews was completed, the researchers met to share and discuss their analyses. Where differences or disagreements occurred, relevant sections of the interviews were again read to come to an agreement. The co-authors then again independently read the interview transcripts to identify patterns and/or group the agreed-upon initial coding into themes. Researchers subsequently met to share their construction of themes and the specific data (quotes or words) that comprised the themes identified. Where there were differences in their analyses and construction of themes, transcripts were again read and analyzed as a group until agreement was reached. This interactive and iterative process of data analysis ultimately yielded nine themes (presented in the "Results" section) that captured the essence or meanings of rhythm in the teaching–learning process for this group of elementary educators in a public school in rural southwest Ohio.

Results

In answer to the question, "What are public elementary school educators' perceptions and experiences of rhythm in the teaching–learning process generally and in their classroom teaching specifically?" 9 themes were constructed from the interview data. These themes included *Patterns*; *Something that Is Everywhere/Anything*; *Natural, Learned (or Not), and/or Unlearned*; *Internalized by "Feeling" It*; *Variation and Change*; *A "Reward"*; *Personal*; *Structural*; and *Contributes to Academic Achievement and Learning*. These themes captured (1) what rhythm meant to study participants (Rhythm Means), (2) what they saw as the significance of rhythm in the teaching–learning process (Outcomes of Rhythm), and (3) the challenges they faced in incorporating rhythm in their teaching (Challenges to Rhythm) (see Figure 1). Below we describe each theme as well as provide evidence of each in the tables.

Rhythm means

To the educators who participated in this study, rhythm meant patterns, patterns that were created in repetition, beat, and/or movement. Rhythm was further experienced as something that was everywhere and could exist in anything. While some saw rhythm as something one could learn (and unlearn), others thought it could not be learned and was "natural." The learning of rhythm started with beats and patterns in the environment that were then internalized through movement and feeling. In addition, rhythm was seen to vary by age and ability and to provide variation or a change in moods. Finally, rhythm also was seen as a means of rewarding students because students (and teachers) found it to be fun.

Patterns. Perhaps more than anything else, rhythm to study participants meant patterns. As indicated in Table 1, rhythm could be auditory repetitions that occur through the beat of a poem or music, a kinesthetic repetition of bodily movement or the patterns of visual art.

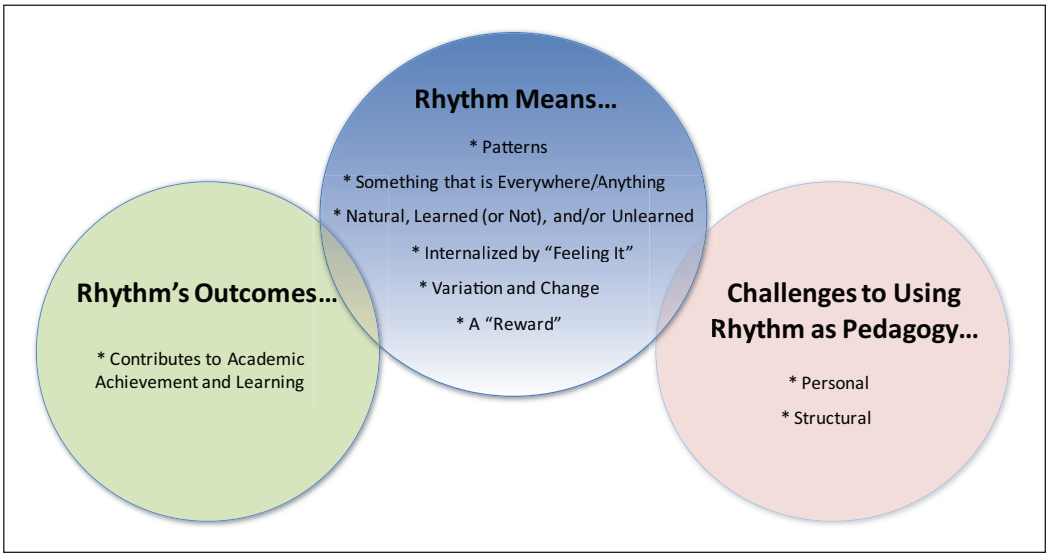

Figure 1. Early childhood teacher's experiences of rhythm as pedagogy.

Something that is everywhere/anything. Study participants noted rhythm was something that was found everywhere and could encompass anything. As the quotes illustrate (Table 1), according to study participants, rhythm is in the flow of traffic and in a classroom.

Natural, learned (or not), and/or unlearned. Rhythm, according to some study participants, is innate or natural—children either do or do not "have rhythm." To others, rhythm is not instinctual but "may be" learned over time—but also unlearned or taken out of children by society (Table 2).

Internalize by "feeling" it. Related to the learning of rhythm, study participants said rhythm was something they wanted children to internalize. Such internalization occurs when children "feel" or experience the "external" rhythm of music, for example, through movements such as foot tapping and hand clapping (Table 2).

Variation and change. Participants experienced rhythm as something that can change their students' moods and to which different students respond differently. Students' grade level, specific disabilities, and tempo in songs change the meaning of rhythm (Table 3).

A "reward." For some study participants, rhythm meant a reward. As the quotes in Table 3 indicate, dance contests and outdoor races are forms of rhythm (bodily movement) that are used to reward students for completion of classroom tasks.

Outcomes of rhythm

In addition to exploring what rhythm meant to elementary teachers, this study explored their perceptions of the positive and/or negative outcomes of incorporating rhythm as pedagogy (see Table 4). Again, this was a school that had implemented a Brain Maze program for 1 year. It was our observation that rhythm was a key educational outcome for students who participated in the daily Brain Maze routine, though we had not explicitly named our observations about rhythm to

Table 1. Rhythm means: patterns *and* something that is everywhere/anything.

Patterns	Something that is everywhere/anything
The rhythm is just the beat of the music, or the beat of the poem, or you know just that constant repetition of just that I guess that movement or sound … I don't know if it's really happening. I start to hear a pattern … of the balls dribbling and sometimes you can see the other kids lookin' around and they're goin' [nods head] and bouncing the ball with the other kids and they're listening to them … when they start bouncing those balls it's all chaos and then I start picking out patterns where I can see that other kids are starting to bounce the balls the same way as the other kids. (P2) And so we talk about rhythm in music and what that is, and we make a beat you know with snapping our fingers or stomping our feet or something. And then I carry that over into "well do you think that we could find rhythm in art?" So we kind of go in that direction and then of course I have examples of prints and I show them that rhythm is kind of … rhythm in the visual arts is sort of like a visual beat you will hear it, it's an auditory beat, and I won't use that word, auditory, with them, you can hear it in music but you can see it in art. And so then I show them some different examples of how, you know, rhythm-[how] it just allows the composition to flow together. Whether you are using color or shape, a variety [of elements] ... it just kind of comes together as one whole piece. just like in music. (P3)	First of all rhythm would happen to be a vocabulary word we had in our last story … It is extremely hard to define … So that was hard to convey to my kids. But I think they didn't think of it as musical rhythm more yet but maybe a beat and its symmetrical or I don't know if that's the word you want to use? But I think that rhythm can apply to anything and it's just a flowing of anything that's happening. If it's … you're talking about the rhythm of life. Is it flowing? You know. Are there stops and starts? You know or is it just … everything? That type of a thing. So I kind of think of rhythm as being that. And in my classroom I like to see myself as being flowing. From one transition to the next. For my kids also to be able to get that. How I want to say is that … when you go into a classroom that I think has rhythm. The transitions are just almost seamless. You know that type of a thing. So that's what I think of when I think of rhythm in the classroom. (P10) You know … it's just so much a huge part of who I am as a person. You know when I'm looking out the window, even driving in a car, the rhythm of traffic, or the rhythm of noise, or the rhythm of being in the country versus the city or whatever is around me influences what I do at the moment. So that has to be the same way here. I mean I'm sure that's how I work with children and why I like bringing some sense of order out of chaos because that's who I am outside of school. So that would be who I am inside of school too. They're not two separate people. That makes sense. I've just never thought of that 'til just now. (P9)

the teachers prior to this study. While teachers perceived or "felt" rhythm contributed to their students' academic achievement (e.g. by improving students' memory, intelligence, rote learning, reading ability, and sense of control of their learning), they also believed such effects were not easy to "prove" or measure—though that did not change their feelings. Five of the teachers also believed that an awareness of rhythm in teaching and learning had changed their pedagogy. As P6 stated,

> There's been a great deal of change in my teaching in the past year. Some of it in part of being my first year, and some of it is learning what ways work with the children … how to do hands-on or kinesthetic things that are going to help them remember things.

Challenges to using rhythm in pedagogy

In discussing their experiences and perceptions of rhythm in the teaching–learning process, we asked the elementary school teachers if they faced any challenges in implementing and achieving rhythm in their classrooms (see Table 5). While some did not see any challenges or constraints on

Table 2. Rhythm means: natural, learned, and/or unlearned *and* internalized by "feeling" it.

Natural, learned, and/or unlearned	Internalized by "feeling" it.
The whole thing boils down to me, everything in life has a rhythm, everything. All you have to do is look around you and listen and it's there constantly. Children, I believe, are aware of all those rhythms, they don't know it, but they are aware. You know, kids go around imitating the sounds they hear on a boom box and they are rhythmically correct. So I think we are all just hard wired to fall into a rhythm … It just makes sense to me that our learning would be more rhythmic than it is, because I believe we are just naturally geared up that way. Not every kid has perfect time and can do count off beats, but I see when I'm with kids there's just a natural tendency to fall into being more rhythmic with what they do. They'll fall into a cadence in a heartbeat. (P5) You know it's something that can be learned. It's something that every student can learn although some of them take … everybody takes different … or some people take more time than others. Everybody's learning pace is different. So when you sit in, for instance, a kindergarten classroom, some of the kindergarteners can keep a steady beat right off, and some of them will not be able to the first year. (P1) Now you and I both know that the amount of rhythm you have has nothing to do with the color of your skin, nothing, and it's a cultural thing … But what I've observed is, in a lot of cultures, we tell the child "don't"—you stifle that … There's a lot of things that we, society maybe, we take away from our children. They should be able to keep. (P5)	I think about rhythm in terms of the music we do in and in the steady beats that we keep during class. We don't talk a whole lot about rhythms in other areas like life rhythms, like you mentioned, life rhythms, that sort of thing. But mostly what we do, especially with kindergarten, the young age group, the kindergarten through fifth grade, is trying to get them to feel an internal rhythm … by internal rhythm I mean … You know, when you're listening to a piece of music, and you just, you, you just start tapping your hands, you start tapping your feet, you know that sort of thing. That you're, you're internalizing that rhythm. You have that rhythm. It's not just something that's in the background but, you, you feel it, and it's not something that you can explain to children. It's something that they just have to experience, and the more they experience, the better they can pick it up … You know we play music, we have them clap the beat, we have them play rhythm sticks, play various percussion type classroom instruments. Anything that I can get them doing that moves their body in time with the music. (P1)

rhythm as pedagogy, others experienced difficulty in realizing it for "personal" and/or "structural" reasons. The data indicated that while most study participants saw themselves as being rhythmic in one way or another and provided examples of rhythmic experiences (in music, physical activity, and visual art) in their lives outside of school, one study participant perceived herself as not having a sense of rhythm and referred to the *personal challenge* she felt rhythm posed to her pedagogy. Others believed the limits of students' abilities presented challenges to using rhythm. In addition, the *structure* and practices of the school day were reported as factors interrupting or restricting their ability to effectively employ rhythm in their teaching and work with students.

Discussion

Our study is the first that we know of to explore teachers' experiences of rhythm as pedagogy in elementary education. In this preliminary investigation, we found that while there was some variation in how these public primary school teachers thought about and used rhythm in their pedagogy, they shared many understandings of, and an appreciation for, rhythm in elementary school pedagogy. Certainly, this may be due to their teaching in a school that had made a commitment to

Table 3. Rhythm means: Public Law PI 107-110, the change *and* a "reward.".

Variation and change	A "reward"
I play it (music) all the time, but it just seems like when I do … but it … it affects kids differently. My older kids are more able to handle the music than my little kids. Depending on the kind of music that I play … the little kids, they hear the music and they stop the activity … my little ones especially my kinder and first [graders], they will stop their activity and sing a song … and as soon as I turn the music off they go back to the activity. *Ode to Joy* made the kids go bonkers whereas *The Flight of the Bumblebee* didn't really have an effect on them, but it depends on the class cause I've had it the other way. (P2) I think you can use it (rhythm) to change your mood. You can use rhythm to change your mood, change your attitude … We have a couple children who don't like the noise and sound. I think that's their personal, you know, processing. You know, we have a couple of Asperger children who just, they can't stand that. They need the … I'm sure they have their own rhythms, but they don't need an external rhythm imposed on them. And some kids need total silence so any outside maybe music or … would probably distract. Yeah I'm sure it would. (P4)	Occasionally I'll take them, usually for a reward, I'll take them outside and we'll do a race or something sometimes. That way we can get that movement in because I think movement definitely helps the brain function a lot, I mean any movement where they're learning how to make their body work, and the motor skills, and we know all those tie to education. (P6) It only takes a few minutes and I actually think it helps because we do journals first thing and they are seated during that time, and then it's just a real quick, you know, we share our journals and then up for the dance contest. It just takes a couple of minutes and they can win a prize if they're picked out as the most unique or creative moves, and they enjoy it and then we move on to the next thing. (P7)

a program (i.e. *Brain Maze*) that consciously incorporated bodily movement into the school. It was for this reason we recruited these teachers to participate in this study. They had experiences and perceptions of rhythm in the teaching–learning process that they could share with us—and thus comprised one type of *strategic sampling* used in qualitative research, an *illustrative sampling* (Mason, 2002).

Rhythm is an important topic to explore given the current trends in education. First, with the implementation of the Public Law PL 107–110, the *No Child Left Behind Act of 2001*, students are under pressure to complete a multitude of high-stakes tests that reduce curriculum time for rhythm-rich activities like art, music, and physical education. As more curriculum time is directed to the improvement of literacy and numeracy, which are also rhythm-based activities (Bruns and Pierce, 2007; David et al., 2007; Nancollis and Lawrie, 2005; Peebles, 2007), some academic subjects are losing funding, decreasing in number, and even being cut completely. This is problematic because a narrow focus on only a few curricular subjects ultimately has negative implications for children's learning, development, and well-being. For example, based on a review of the extant research, Berg (2010) notes that daily quality physical education appears to increase the rate of learning and is positively related to academic achievement. The studies he reviewed also indicated that allocating less time for physical education and more time for core subjects during the school day does *not* guarantee improved academic performance. In addition, eliminating subjects where movement/rhythm is central leaves those students who need an enriched rhythm-based education behind, lacking the knowledge and skills valued by and needed in our society today. As was most recently demonstrated by Taub and Lazarus (2012), the development of timing/rhythmicity may serve to enhance reading fluency and skills and to reduce reading disabilities. By reducing time in any

Table 4. Outcomes of incorporating rhythm as pedagogy.

Contributes to academic achievement and learning	Contributes to academic achievement and learning
We do a lot with patterns and … it really benefits all students. Even the auditory students learn well when there is rhythm involved and it helps them to have another way to remember it if the auditory isn't working. So it's beneficial for all the students involved not just the ones that are strongly kinesthetic and it's good for them to be able to learn using different learning styles around different people that way no matter whose teaching them or what style they teach in they'll be able to use that to learn. (P6) I have strong feelings on that. I think it's fabulous. Absolutely fabulous, and I also think it gets in your brain better like what I was just … you know … where even when I'm going "two plus two" we don't clap [claps]. I think it doubles the effect. I think it's great, especially for rote learning, and there's a lot of that in school, you have to do a lot of rote learning. So I think it's great for that. I also personally think that probably rhythm, the more you do things like that, and the more you do drums and everything else in the classroom … First of all, I think it probably increases intelligence, but I don't know that, but secondly I just think it increases learning. And I've watched PBS specials now, they're having a lot of music things in classrooms where they have oriented music classes where they're putting on, they're doing all kinds of stuff. I feel that we could write a grant for our school to get lots and lots of instruments and it would be fabulous. I think it's really important. (P8)	I think that if you try to incorporate that or try to see that as an objective of your teaching. I think that you're gonna' see kids get the instruction better. They're gonna' be more open towards it. You're not gonna' have to be quite so … what I would like to search for is have them become more of their own learner. More in control of their own learning. And that's what I think you have to develop is an atmosphere of rhythm so that it enables them to do that. So I think that's what I personally try to strive for is just so that you walk in and it's … rhythm is the flowing of learning throughout the day. So … like I said do I always reach it? No. But that's what I'd like to see the end result of it would be. (P10) I think one of the things you asked, one of the questions you asked was about being able to see how rhythm impacts student achievement, and that's something that I think people have tried to measure, and it's not something that is easily measurable, because increases in achievement are normally attributed to a classroom study or pedagogy, or that sort of thing, and it's difficult to measure how music and for that matter art and P.E., impact student achievement. It's difficult to measure exactly how being able to keep a steady beat or being able to internalize a rhythm impacts achievement in say, reading or math. Now as a music teacher I believe it does. I believe that that's vital, that learning the arts is vital to student achievement, but proving that is sometimes difficult. (P1)

curricular area, students have less practice time dedicated to overall rhythm-based activities. As Armstrong (2003) called for a decade ago in response to the research supporting Gardner's (1993) work on multiple intelligences, educational reform needs to place an "… increased emphasis placed on the arts, nature, physical culture, and other topics traditionally limited to the periphery of the curriculum" (p. 4).

Less time for rhythm-based activities should be a concern because rhythm is a key neuroscience component in information processing and learning (Grahn and Brett, 2007; Molinari et al., 2007). Rhythm requires synchronization between the vestibular apparatus in the ear, which deals with balance, and the cerebellum, which plays a role in coordinating motor timing. Motor timing and sequencing are rhythmic patterns that help to enhance learning. Although deficits in the function of the vestibular apparatus are not life threatening (Mehta and Stakiw, 2004), a lack of rhythmic coordination with the cerebellum can lead to many symptoms such as groping for words, fear, alarm, fatigue, balance difficulties in the dark, difficulty understanding words, and anxious or aggressive behavior. As such, a child's learning potential, health, and quality of life can be negatively affected.

Table 5. Challenges in using rhythm in pedagogy.

Personal	Structural
You always have just a few, a handful of students that it is just something … they just don't get it or there's no connection there. And I think that's just something that they might be so conscious in what's going on but they … it's hard for them to allow themselves to just open up and be free. They're one of those that there is a right or wrong and that's one thing that I emphasize in art that you know art is a lot like math except in math there is always one answer but in art there are several different answers to the one problem. They get so caught up in the right and wrong of everything that it's hard for them to just let go. (P3) I personally haven't done much musically—I'm not musically talented, but different subjects lend themselves to different things, so we've done some snapping and clapping to do vocab words and phonics with our spelling … I think it's really great to use rhythm in the classroom. I try to do it as much as possible, but … I'm mostly an auditory learner. So it's not my strength, but I try to incorporate it whenever I can and whenever I think about it, but it takes a little more effort than someone that's naturally kinesthetic. (P6)	Like I said I think my big idea is that I would like to see the flowing throughout the day. So when you're interrupted with things, that's hard to make that. You know what I mean? Kids tend to think that okay once the hour stopped in the classroom and we have to go like we're going to a concert this afternoon. The flow just kinda' … cause it's so hard to get them back on track to what you were trying to make the whole day about … You know so those outside things that are interruptions. That kind of dampens what I like to see in my classroom. Just like today we had a meeting with … three other teachers and the principal about a student we were discussing and you know that was totally off of my flowing of the day. … So I think once you get off of it, it's really hard to get back on … it's just like it … The front needs the next step, the next step needs the third step, you know and that type of a thing. So when that's interrupted I think it's a real … it hinders it a lot. (P10)

Finally, there is a growing body of literature outlining the relationship of music and math (Southwest Educational Development Laboratory, 1998), music and literacy (Hansen et al., 2004), and music, learning, and academic success (Perret and Fox, 2006). Specifically, the National Council of Teachers of Mathematics suggests that rhythms produced by hand clapping and stomping in response to a teacher's movement patterns can enhance spatial–temporal reasoning important in the development of mathematical reasoning. For example, by learning to beat half time, quarter time, and eighth time through rhythmical sound patterns, students can feel and understand numerical fractions, thus using rhythm as a warm-up exercise to more abstract numerical concepts and reasoning (Southwest Educational Development Laboratory, 1998).

In another context, Perret, the music director of the Winston-Salem Symphony in North Carolina, initiated a musical program at Bolton Elementary School in 1994, now known as the Bolton Project, with the hopes to improve academic performance. By integrating orchestral music into the curricula of children who had backgrounds of poverty, racial minority status, language barriers, learning disabilities, and below-average IQs, Perret and Fox (2006) found that 85 and 89 percent of third graders who had studied music since the first grade scored at or above grade level in reading and math, respectively. After several years with a music curriculum which involved 30 minutes of group music instruction three times a week, Bolton Elementary School was reclassified from an "at risk" to an "exemplary" school. Although these findings did not constitute a scientific study, Perret and Fox (2006) posited that sensory integration and neurological enrichments occurred across the *corpus callosum*, which connects the left and right hemispheres of the brain.

What the results of the current study add to these understandings is insight into public elementary school teachers' everyday experiences of rhythm, the meanings they make of it, and the positive outcomes it may engender, in the teaching–learning process—as well as the challenges they face in incorporating rhythm in public education classrooms today. These insights have implications for both practice and future research.

Implications for practice and future research

Educators may have limited professional preparation in using rhythm in teaching and learning. Rhythm is generally perceived as germane to music, art, and physical education—and as such may be identified more traditionally within those academic areas. However, rhythm is a macro concept in that it serves an integral role in *all* academic disciplines and has important potential in interdisciplinary curricula design. For example, rhythm is important in the growth and development of all life forms and in human learning processes such as counting in math (Southwest Educational Development Laboratory, 1998) and reading and writing patterns in language arts (Bruns and Pierce, 2007; David et al., 2007; Taub and Lazarus, 2012). As an interdisciplinary curriculum theme and as an outcome of school-wide programs like *Brain Maze* or *Minds-in-Motion* (2012), rhythm is a concept and skill to be learned and promoted as a pedagogical strategy in more explicit ways. Teachers may benefit from more pedagogical practice in incorporating rhythm in classroom activities for all academic subject areas. For example, Peebles (2007) outlines how movement and reading can be integrated. Specifically, Peebles contends that elementary teachers can use movement for motivating students to practice repeated readings of the same passage over and over again to improve fluency—a key aspect of reading success. Peebles believes that "movement conceptualizes the rhythmic nature of fluent, expressive reading and allows children to experience and 'feel' how fluent reading should sound …" (p. 578). Activities such as Readers Theatre and Rhythm Walks, which "draw attention to the natural breaks and phrasing of text through purposeful 'steps' or movements" (p. 579), are incorporated in the classroom for both adequate and struggling readers in order to activate and strengthen neurological connections in the occipital–temporal region of the brain responsible for vision and rhythm, respectively.

We believe children can learn to recognize the role that rhythm plays in specific academic tasks during the learning process and in health-related activities of daily living as long as teachers have also been introduced to the value of rhythm for children's health and learning in their professional preparation–and feel they have the knowledge and ability to competently use it in their pedagogy. In order for educators to teach a concept or skill, they need to see the value in it (Clandinin, 1989)—and feel they are able to teach it. This study illustrated how rhythm is a personal or subjective experience that individuals come to know and to do (or not). More studies need to explore the knowledge and skills educators need to use rhythm in their pedagogy and their underlying fears, assumptions, values, and preferences toward rhythm in general and rhythm-based pedagogy across the curriculum. Future studies also need to explore the preferences and perceptions that children and youth have when engaged in rhythm-based activities across the curriculum. Furthermore, we recommend more qualitative explorations of this topic. Constructivist theory would suggest that we construct meaning from our lived experiences (Vygotsky, 1978). If teachers and students have limited to no experience with rhythm in lives outside of school, as well as in their teaching and learning, respectively, they may not develop or realize their full potential as individuals. However, social constructions of meaning (like that afforded by the qualitative interview process) establish a place for study participants to think about and reason out some preliminary and/or more sophisticated thoughts about rhythm because someone is asking the question about rhythm. This social construction of meaning is a value of

qualitative research as it provides the opportunity to engage in a dialogue about ideas that need more illumination or description for professional practice.

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