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## ABSTRACT

The study's specific goals were to adapt conventional flow methodology to define and operationalize young children's cognitive strategies exhibited during their participation in adult-guided musical activities; and develop a valid and functional method of assessing young children's musical cognition "in situ" through systematic and rigorous observation of their overt behaviors in this music learning context. To realize these objectives, a three part procedure was implemented: (1) development of the instrument; (2) determination of the instrument's reliability through an examination of agreement between multiple raters; and (3) determination of the instrument's validity through analytical comparisons with past research of flow experience. Participants consisted of one class of 11 beginning music students, ranging in age from 4.5 years-5.9 years. Eight weekly 1-hour music classes were videotaped for analysis. Through direct observations and analysis of these children's learning experiences, a coding scheme, the Flow Indicators in Musical Activities (FIMA) form, was developed based on Csikszentmihalyi's Experience Sampling Form. Data were coded by focusing on a single participant throughout an entire musical event. It was concluded that: (1) flow is an observable phenomenon and the FIMA form is a valid and reliable tool for assessing flow in young children's music learning experiences; (2) children employ cognitive strategies to construct their own musical understandings; (3) in a music learning context, the quality of adult intervention plays an important role in children's quality of experience and flow; and (4) young children use peers and adults in their music educational environment differently. (Contains 4 tables and 36 references.) (BT)

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Construction of Musical Understandings:  
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Paper presented at the "Cognitive Processes of Children Engaged in Musical Activity" Conference  
June 1999  
University of Illinois, Champaign-Urbana

Lori A. Custodero

Introduction

Overview

Cognitive theory.

Piaget's (1962, 1971) theory of cognitive development offers a constructivist perspective, one that acknowledges children's roles in creating their own understanding through interaction with their environment. His concept of equilibration suggests children monitor their own learning processes: Through mental reflection and action they either interpret physical truth unconventionally in order to explore its functions within their existing schemas (assimilation), or change their perceptions to accommodate the new information. In a discussion of these manipulative strategies, Feldman (1994) refers to Piaget's work as "the first distinctly psychological theory of intellectual change" (p. 149).

Such self-initiated changes which help define cognitive process result from the human tendency to construct systems of order. Feldman (1994) delineates between Piaget's two categories of change, assimilation and accommodation, which move *toward* stabilized knowledge, and what he terms the "transformational imperative," which moves *away from* stability. He considers this creative urge to be a clear sign that development occurs, and suggests it be included with assimilation and accommodation as a tripartite process for interpreting children's thinking.

Additionally, Feldman (1994) notes that Piaget (1971), primarily concerned with universals in development, had difficulty applying his theories to creativity. Feldman posits studying novel transformations of given reality requires a non-universal approach to cognition; children may have domain-specific or individualized capabilities which facilitate their transformations. Gardner's (1983) theory of multiple intelligences supports this claim for domain-specific cognitive processes.

The constructivist perspective, or what might be considered the study of intellectual change, holds particular significance for the investigation of artistic understanding, which is characterized by interpretive and creative experience. It is from this background that a generalized series of questions emerged regarding young children's music learning: How do children construct their own musical understandings? Can these constructions (assimilations/ accommodations/ transformations) be observed? Since cognition results from interactions with the environment, are there specific conditions that best facilitate musical understanding? To answer these questions it was imperative to view children in a natural setting rather than in the confines of a laboratory, and to investigate their experience, rather than measuring researcher-derived outcomes. Such observation of everyday activity has been undertaken by many cognitive researchers (Brown & DeLoache, 1983; Lave, 1997; Mehan, 1997; Quinsaat, 1997; Saxe, 1997); it is believed that observing children's contextualized use of musical knowledge provides an ecologically valid window into their cognitive processes.

#### Flow theory.

In the realm of social psychology, the everyday contexts which facilitate creative, intrinsically rewarding experience have been studied by Mihalyi Csikszentmihalyi (e.g., 1975, 1990, 1997). He and his colleagues collected self-reports from individuals engaged in a variety of

domains, including surgery, rock climbing, chess playing, composing, and dancing. They found that participants described similar qualities of their experience: activities were enjoyable and challenging and were therefore autotelic, or rewarding in themselves (Csikszentmihalyi, 1975).

Through refinement of the methodology and further analysis of individuals' self-reports, researchers have derived a set of conditions which facilitate optimal experience, or what they call "flow" (Csikszentmihalyi 1990, 1993, 1997a, 1997b; Csikszentmihalyi & Csikszentmihalyi, 1988). These include the perception of clear goals, reception of immediate feedback, merging of action and awareness, existence of high concentration levels, sense of potential control by the individual, and loss of self-consciousness. These conditions for flow were witnessed frequently and consistently during preschool music classes taught by the current investigator. The aural, visual, and kinesthetic qualities of musical activities provided multiple vantage points for goal perception as well as opportunities for clear and immediate feedback; the active nature of music-making required a merging of action and awareness; and singing, moving, and playing instruments were all activities for which the individual was the locus of control.

Additionally, the flow state is characterized by elevations in both the perceived challenge level and the perceived skill level for an activity: Studies show that people in flow feel highly challenged and highly capable; individuals who are insufficiently challenged and/or feel incapable of meeting the demands of the activity report feelings of apathy, boredom, or anxiety (Csikszentmihalyi, 1997a).

### Conceptual Framework

The relationship between flow experience and cognition becomes clear when considering the nature of cognition as intellectual change. Flow results from a dynamic interaction between perceived high challenge and perceived high skill for an activity: Transformations take place as

challenges and/or skills increase or decrease, and the individual adapts to those new levels in an attempt to sustain flow experience. Activities which produce flow are self-rewarding, and therefore, self-perpetuating; as an individual's skill level improves through practice, challenges must become increasingly complex. The desire to maintain the flow state poses a problem: "How can this activity be made more complex?"; the study of how individuals might solve this problem may indeed provide insight into their cognitive processes.

The interface between cognition and flow can be defined not only through the parallelism between individuals' attempts to maintain flow through increasing their own challenge levels and the notion of a transformational imperative, but also with regards to the study of affect. The flow paradigm is defined by participants' own perceptions of high challenge and high skill, suggesting the importance of self-efficacy. Cognitive psychologists (Bandura, 1993; Cross & Markus, 1994, Eisner, 1984) have linked the presence of high self-concept with cognitive performance, offering further support for use of the flow construct as a window on cognitive processes.

Zajonc and Markus (1984) write about the relationship between affect and cognition in terms of motoric representations, providing rationale for the observation of cognitive processes in young children. They state that these physical manifestations "can provide a rich database revealing affective and cognitive phenomena that can be directly observed, measured, and manipulated" (p. 74). The analysis of gesture in the development of cognition has been utilized by language development researchers as well (Blake & Dolgoy, 1993).

In order to expand the construct of flow experience to the study of young children's cognitive music-making processes, two concerns needed to be addressed. The first was methodological: Conventional studies of optimal experience relies on the self-reports of older participants in multiple contexts. Researchers (Csikszentmihalyi, 1975; Csikszentmihalyi &

Csikszentmihalyi, 1988; Csikszentmihalyi & Larson, 1984, 1987; Csikszentmihalyi, Rathunde, & Whalen, 1993) have designed an Experience Sampling Methodology (ESM) to investigate the daily experiences of adolescents and adults. For the ESM, participants wear electronic pagers for a week or more; the pagers are randomly activated 8-10 times throughout each day. When signaled, participants stop whatever they are doing to fill out a form detailing their immediate experience and their feelings about that experience. For the current study, a new procedure based on observation of young children in a single educational context had to be developed. Previous investigations have indicated that observing children in a valid ecological context (Bronfenbrenner, 1979) and recording their behavior as well as how they feel about that behavior (Gabarino, Stott, & Faculty of the Erikson Institute, 1992) are developmentally and scientifically appropriate methods.

The second issue in expanding the flow model was theoretical: Although Csikszentmihalyi purports that the study of flow has more to do with motivation than with cognition (1997b), it was believed that adapting his model to observe children in a singular educational context would result in important findings regarding the use of cognitive strategies during the learning experience.

Evidence linking the measurement of flow with learning and cognition suggests an important, unexplored approach for increasing awareness of children's musical understanding. Csikszentmihalyi (1993) believes that children are in flow most of the time; it is hypothesized that through systematic observation of children's attempts to maintain the flow state in a music learning environment, their cognitive processes would be revealed.

## Goals

Specific goals of this inquiry were to adapt the conventional flow methodology in order to (a) define and operationalize young children's cognitive strategies exhibited during their participation in adult-guided musical activities and (b) develop a valid and functional method of assessing young children's musical cognition *in situ* through systematic and rigorous observation of their overt behaviors in this music learning context. To realize these objectives, a three-part procedure was implemented: (a) development of the instrument; (b) determination of the instrument's reliability through an examination of agreement between multiple raters, and (c) determination of the instrument's validity through analytical comparisons with past research of flow experience.

## Methods

### Participants and Setting

The setting for the study was a privately owned and operated music studio specializing in young beginners, ages three through ten, located in a suburb of Los Angeles, CA. Children and parents attended classes together once a week for an hour: curriculum was sequential and prescribed by the school. Participants included one class of eleven beginning students, ranging in age from 4.5 - 5.9 years; formal observations began at the 12th lesson after the onset of their formal musical training with the school. Selection of the class was made on the basis of optimal conditions in terms of scheduling and enrollment. Children in the present study included seven females and four males from a wide variety of ethnic backgrounds including Hispanic, Middle Eastern, African American, Asian, and Western European.

### Data Gathering

Eight weekly one hour music classes were videotaped for analysis. The video operator, familiar with the curricula used at the school, was given the following criteria: (a) be as unobtrusive as possible; (b) randomly select a child or group of children whose affect and body movements are clearly visible; (c) remain focused on the same child or group of children until the musical event ends; (d) choose another child or group of children for the next event. Events were defined musical activities from the school's curriculum and included subcategories within major headings of singing; playing keyboards; keyboard preparation (a combination of singing, clapping, reading, and moving); rhythm, ear training, and skill-development games; writing; and storytelling. The number of children available for coding for each event varied depending upon the context of the activity.

### Instrumentation

Through direct observations and analysis of these children's learning experiences, a coding scheme, the Flow Indicators in Musical Activities (FIMA) form, was developed based on Csikszentmihalyi's (1975, 1988) Experience Sampling Form.

(Insert Figure 1.)

Information was recorded defining the event, its length, and its familiarity to the students. Additionally, the FIMA form included a 7-point semantic differential scale of nine affective indicators (happy - sad, cheerful - irritable, involved - distracted, alert - drowsy, active - passive, excited - bored, satisfied - frustrated, successful - failure, comfortable - uncomfortable). These were taken from Csikszentmihalyi's self-reporting form and adapted to accommodate the observational context and unique interactional styles of children.

The lower half of the form was a 10-point Likert scale examining eight behavioral

manifestations of flow. Since flow is defined as a match between skill level and challenge level, it was necessary to record each of these variables. Perceived challenge was determined by the observation of a child's conscious attempts at self-correction and self-assignment, as well as a deliberateness of gesture and focus. These visible cognitive strategies provided motoric manifestations of thinking; self-initiated regulation has been linked to other areas of cognitive development as well (Brown & DeLoache, 1983; Rogers, 1983). Skill level was based upon performance accuracy as determined by the coders, who were familiar with the curricular expectations of this age group.

Children's awareness of parents and peers was considered an important way of checking on absorption and intrinsic motivation. This perception of others addresses Csikszentmihalyi's views about both the level of self-consciousness and the activity's significance for the individual vs. significance for an other. The social context of learning and flow experience is crucial and complex; in addition to the need for self-activated meaning, Csikszentmihalyi (1978) purports that emergent motivation, the self-perpetuating quality of flow experience discussed above, is dependent upon another's giving meaning to the activity. Awareness of others, both adults (teacher and parents) and peers was judged by the number of times children looked for approval, permission, or camaraderie for their actions and responses.

New to this study of children were several flow indicators specific to the observation of younger participants in an educational setting. Three discrete operationalizations of flow emerged as children monitored their own challenge levels by manipulating teacher-delivered material; as cognitive processes they were indicative of children's solutions to the problem "How can I make this activity more complex?". Participants *anticipated* the material by spontaneously verbalizing newly discovered relationships and guessing what came next in the teacher's delivery. Participants

*expanded* the material by making the task more complex within the teacher-defined time frame (a good example was children playing "air piano" when the expectation was that they would echo pitches and shape the melodic contour). Participants *extended* the musical activity past when the facilitating adult said it was over, exemplified in one student's improvisatory dance following a rhythm reading activity. Through these transformational processes, children were observed constructing their own understandings.

Intensity of imitation was included because of its representation of task absorption and its role in providing feedback; imitation is a pervasive instructional technique used in most children's music education settings. Intently utilizing other people in the environment as models appeared to provide feedback and either confirm performance or initiate self-correction. This variable was coded through observing facial expression and body movement in direct imitation of the teacher or peers, as well as verbal and pantomimed imitation of teacher's words.

The last question, "Was child in flow?" was introduced as a dependent variable for validity testing, and was determined by the coders using the following description:

The child is focused and absorbed in the present event. Gaze is usually attentive on the facilitating person or object. However, when physical manipulation is not a task-defining element, a less-focused gaze may reflect an internal "working out"--a personalizing or "taking ownership" of the less tangible event. Affect is often positive and sometimes neutral, within varying levels of intensity usually reflective of individual personality differences. It is never negative. At the completion of the event there is usually a heightened observable affect due to awareness of success. There may be a desire to share that awareness with a nearby significant other.

There is a level of obliviousness to one's physical condition. Physical movement toward the facilitating person or materials is common.

For the purposes of developing theory and refining the measurement tool, anecdotal information was also gathered. Observations dealing with children's creative application of the material or other relevant behaviors were considered significant.

### Coding Procedure

Data were coded by focusing on a single participant throughout an entire musical event, recording scores for each question as well as any anecdotal information, reviewing as necessary, and repeating the process until the experience of each [randomly sampled] child clearly visible for the entire event had been coded. The complete process was repeated for each event on the taped lesson, ranging from 15-20 events per tape.

The researcher and a highly skilled trained assistant, who was likewise familiar with the curriculum and teaching strategies of the school where the study took place, each coded all the data, in order to check for reliability of the measurement. Coding resulted in a total of 142 events coded for between one and eleven children; the outcome was 472 FIMA entries.

### Findings

#### Reliability of the FIMA

In an effort to best represent the agreement between the two raters, frequency calculations were made for each variable to determine what percentage of responses were in perfect agreement, what percentage of responses were in agreement within one coding degree in either direction, and what percentage of responses were in agreement within two coding degrees in either direction. Levels of agreement between the two coders ranged from 62.5% to 98.3%

within one coding degree, and from 81.9% to 100% when considering agreement within two degrees.

#### Validity of the FIMA: Descriptive Statistics

Descriptive statistics for the affective flow indicators revealed that children maintained positive affect most of the time. Similar findings have been reported in studies of adolescents' school experience--music classes tended to engender more positive experiences and more flow than classes in other subjects (Csikszentmihalyi, Rathunde, & Whalen, 1993; Csikszentmihalyi & Schiefele, 1992). Greater variation was found in scoring for the Behavioral indicators of flow. The highest and most closely matched means were for challenge, skill, and flow, suggesting the high challenge + high skill model of flow may be operating in the early childhood music classroom being studied.

Awareness of adults and peers in the environment had relatively low means, suggesting they were not salient aspects of the learning condition. The three operationalizations of flow, anticipation, expansion, and extension, varied in mean scores, possibly due to methodological constraints. Imitation had the highest standard deviation, suggesting variation within events or participants.

#### Validity of the FIMA: Factor Analyses

As a research paradigm, flow experience is defined not only by high challenge + high skill, but also by the heightened existence of several experiential states (Csikszentmihalyi & Larson, 1984, 1987; Csikszentmihalyi et al., 1993; Csikszentmihalyi & Schiefele, 1992; Kubey & Csikszentmihalyi, 1990; Larson & Richards, 1993). These states, or dimensions, are derived by the convergence of many indicators into a smaller number of discrete factors. In order to establish the validity of flow as an observational construct in the present study, factor analyses

were administered; it was expected that resultant factors would be similar to those found in studies employing traditional flow methodology.

The nine affective variables--happy, cheerful, involved, alert, active, excited, satisfied, successful, and comfortable--represented by semantic differential scales on the FIMA form, were subjected to analysis using principal factors extraction: The most distinguishable and well-defined dimensions were revealed in the four factor solution, shown in the rotated factor matrix in Table 1. Factor 1 accounted for 57% of the total variance in affective dimensions of flow experience; Factor 2 accounted for an additional 11.2%; Factor 3 accounted for an additional 9%, and Factor 4, and additional 7%. Thus, the four factors accounted for 84.2% of the total variance in the affective dimensions of flow experience.

(Insert Table 1)

The affective flow dimensions revealed by the factor analysis are similar to the dimensions cited by other researchers of flow experience. Those variables loading on the first factor, happy + cheerful + excited, express positive affect, a category interpreted by Csikszentmihalyi (1997) as a discrete quality of experience, and similar to the Affect dimension used in previous flow studies. Those variables loading on the second factor, alert + involved + active, express level of involvement; this dimension is similar to the mood described as Potency and defined by participants feeling alert, active, strong, and excited (Csikszentmihalyi et al., 1993). The third factor was defined by loadings of success and satisfaction, which reflect the intrinsic reward or autotelic nature of the activity. This dimension is similar to a category Rathunde (1988) calls "Self-concept," which has component variables referred to as "feel good about self," "up to own expectations," and "satisfied how doing" (p. 352). Comfort was found to be alone in the last factor. Reasons for this include the fact that it showed the lowest correlations with other affective

indicators; accordingly the factor may not have emerged in analysis. Anecdotal descriptions revealed that comfort did not seem related to the other flow variables. Comfort also differs from the other affective indicators in that it is a measure of a physical rather than an emotional state.

Next, the eight behavioral flow variables--perceived challenge, adult awareness, peer awareness, anticipation, expansion, extension, imitation intensity, and performance accuracy (skill level)--represented by a 10-point Likert scale on the FIMA form, were subjected to a factor analysis. The variable represented by the last question on the form, "Was subject in flow?" was retained as a separate entity to measure validity of the emerging flow dimensions. The initial principal factors extraction elicited three factors with Eigenvalues above 1.00. Varimax rotation converged in six iterations: All factors extracted by the initial solution were distinguishable and well-defined as shown in the rotated factor matrix in Table 2. Factor 1 accounted for 25.5 % of the total variance in behavioral flow dimensions; Factor 2 accounted for an additional 21.1%; and Factor 3, an additional 15.5%. Thus, the three factors accounted for 62.1% of the total variance in behavioral flow dimensions.

(Insert Table 2)

The factored behavioral flow dimensions produced some provocative results, due to their uniqueness to this observational study with children. Anticipation + skill level + expansion + extension loaded on to Factor 1. This strong association between the three operationalizations of flow experience and the skill level of the participant indicates these physical manifestations children exhibit in the classroom may well be cues to both their experience of flow and their cognitive processes.

The remaining indicators converged into unexpected combinations: Perceived challenge with adult awareness comprised Factor 2; imitation intensity with peer awareness, Factor 3. The

correlation between these last two factors was statistically significant and negative, indicating children use feedback from adults and peers differently. The data suggest children utilize the high profile adults in their environment to help monitor their own challenge levels. In the context of the present study, parents and teachers provided the support and structural background which facilitated children's evaluation of their own experience. Data also revealed children use peers as a source of imitation; correlation tests showed awareness of peers to be negatively related to the other behavioral indicators of flow experience. Imitational awareness of peers may be a strategy for vicarious participation in the activity; that is, instead of being personally involved with the activity, individuals are controlling the quality of their non-flow experiences through imitating peers during an activity for which they themselves feel inappropriately challenged or skilled.

Affective dimensions were named relative to associations with findings from previously cited flow research: Factor 1 was called Affect; Factor 2, Potency; Factor 3, Self-concept. Factor 4 was named for its single component, Comfort. Behavioral dimensions were named for the strongest member variable in the grouping. Factor 1 was called Behavior because of the three behavioral manifestations which loaded with skill level. Factor 2 was called Challenge; Factor 3, Imitation.

#### Validity of the FIMA: Regression Analyses

To determine which of the 7 experiential dimensions predict flow, standard multiple regression analyses were computed using "Was child in flow?" as the dependent variable. Results showed that the affective dimensions accounted for 67% of the variance in flow and so can reliably predict the construct. Most of the variance was attributable to Potency; the other significantly contributing dimension was Self-concept. Affect and Comfort did not contribute significantly to the variance in flow. These findings concur with past flow research: Potency and

Self-concept have been found to be related to flow; Affect, or Happiness, is usually felt as a result of external conditions or as a reflection from having been in flow. Comfort, as a physical rather than emotional state, was not a meaningful dimension within the limitations of this study.

(Insert Table 3)

The relationship between the measurement of flow and cognitive processes is strengthened by these findings; component variables in the flow-facilitating dimensions of Potency (alert, involved, active) and Self-concept (satisfied, successful) are analogous to the previously cited link between self-efficacy and cognition (Bandura, 1993).

A separate analysis showed behavioral dimensions account for 55% of the variance in flow and so can also reliably predict the construct. The greatest percentage of the variance was attributable to Behavior, which included the child's manipulation of teacher-delivered material. The other significantly contributing dimension was Challenge with its component of adult awareness.

(Insert Table 4)

The flow-facilitating dimensions of Challenge and Behavior are both comprised of variables which reflect verbal and physical [motoric] manifestations of flow--perceived challenge, measured by self-correction, self-assignment, and deliberateness of focus and gesture, as well as anticipations, expansions, and extensions of teacher-initiated activities. Interpreted as observable cognitive strategies, these transformations of musical material reveal children's attempts to construct their own musical understandings.

Imitation (with its component, peer awareness) did not contribute significantly to the variance in flow. This finding is supported by cognitive theory in the domain: Fiske (1992) writes "music cognition is a constructive process, not a copy process" (p. 366).

### Conclusions and Educational Implications

Because of the small sample size of the study, the ability to generalize findings is limited; recommendations for further research include replications of the current investigation in a variety of music educational environments for young children. The following conclusions are presented in an effort to further the understanding of young children's music learning processes:

1. Flow is an observable phenomenon and the FIMA form is a valid and reliable tool for assessing flow in young children's music learning experiences. High levels of interrater agreement, observable behavioral manifestations of flow, and similarities between factor analyses of flow indicators in the present study and in previous research provide evidence to support this conclusion.
2. Children employ cognitive strategies to construct their own musical understandings. The clearly observable attempts by participants to self-regulate their own challenge levels by anticipating, expanding, and extending teacher-initiated activities and by self-assigning and self-correcting confirm that children want to be highly challenged and have a sense of how to monitor that challenge for themselves.
3. In a music learning context, the quality of adult intervention plays an important role in children's quality of experience and flow. This was evidenced in the factor analysis results--adult awareness and perceived challenge converged into one single dimension that was predictive of flow. Csikszentmihalyi (1997) writes "consciousness resonates to the feedback we receive from other people" (p. 78). He outlines two conditions for flow-facilitating relationships: goals must be compatible, and one must be willing to invest attention in the other person's goals. This Vygotskian (1978) perspective offers yet another link between cognitive theory and flow experience: when adults invest attention in children's goals and offer meaningful feedback, they

provide the scaffolding necessary for cognitive development. Further analysis of the data presented in this study (Custodero, 1997) suggests the best type of interactions are those which prescribe value and define the focus for an event; negative effects were observed when uninvited intervention interfered with children's efforts to evaluate, monitor, and adjust their own challenge levels.

4. Young children use peers and adults in their music educational environment differently. Adult awareness and peer awareness were negatively correlated; factor analysis resulted in the convergence of awareness of peers with imitation, and adult awareness with perceived challenge. The utilization of peers as sources of imitation may serve as a precursor to flow experience, as children, wanting to be involved in the activity yet lacking a sense of their own ability to potentially control its content, rely upon the imitation of a model to heighten their experience.

Accepting flow as a valid construct for the measurement of experience and for insight into cognitive processes in the early childhood classroom has implications for music education. By providing a means for teachers to evaluate student response to activities in the moment, strategy adjustments can be made spontaneously so that challenges and skills can be kept in balance and flow can be sustained. Educators can be trained to watch for and encourage signs of self-assignment and self-correction as well as anticipations, expansions, and extensions of presented activities. In addition, for optimum facilitation of learning, curriculum design must focus on the delivery of intrinsically meaningful material that is open-ended enough to be transformed by the children. Although imitation is widely used to teach musical skills, findings in this study suggest it should not be the singular presentational method for a musical concept.

Most importantly, teachers need to acknowledge students as active agents in their own learning. When educators create environments which facilitate flow, children can retain their

joyful, spontaneous, and focused involvement as they learn to sing, move, play instruments, read music, improvise, and compose.

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Table 1

## Factor Analysis of Affective Flow Variables

Variable	Factor 1	Factor 2	Factor 3	Factor 4
Happy	<b>.882</b>	.220	.181	.068
Cheerful	<b>.870</b>	.174	.211	.167
Excited	<b>.720</b>	.390	.301	.151
Alert	.328	<b>.812</b>	.179	.065
Involved	.116	<b>.789</b>	.234	.206
Active	.278	<b>.753</b>	.326	.057
Satisfied	.299	.305	<b>.836</b>	.135
Successful	.245	.315	<b>.831</b>	.199
Comfortable	.190	.169	.204	<b>.940</b>

Table 2

## Factor Analysis of Behavioral Flow Variables

Variable	Factor 1	Factor 2	Factor 3
Anticipation	<b>.740</b>	.106	-.356
Skill	<b>.740</b>	.127	-.206
Expansion	<b>.697</b>	-.135	.330
Extension	<b>.588</b>	.011	.427
Challenge	.016	<b>.877</b>	.209
Adult Awareness	.037	<b>.765</b>	-.264
Imitation	.038	.114	<b>.749</b>
Peer Awareness	-.153	-.349	<b>.588</b>

Table 3

## Standard Regression of Affective Flow Dimensions with Flow

Variable	B	SE B	Beta
Affect	.065	.048	.059
Potency	.551	.052	.478***
Self Concept	.361	.049	.344***
Comfort	.058	.037	.058

Note. \*\*\*  $p < .001$ .  $R^2 = .67$ ,  $p < .001$ .

Table 4

## Standard Regression of Behavioral Flow Dimensions with Flow

Variable	B	SE B	Beta
Behavior	.995	.053	.706***
Challenge	.224	.044	.191***
Imitation	.061	.047	.049

Note. \*\*\*  $p < .001$ .  $R^2 = .55$ ,  $p < .001$ .

FLOW INDICATORS in MUSICAL ACTIVITIES FORM

Specific activity: \_\_\_\_\_ Length of activity: \_\_\_\_\_ Date: \_\_\_\_\_

Familiarity with activity: \_\_\_\_\_ Child: \_\_\_\_\_

v=very, q=quite, s=somewhat, n=neither

	V	Q	S	N	S	Q	V	
Happy	<input type="radio"/>	Sad						
Cheerful	<input type="radio"/>	Irritable						
Involved	<input type="radio"/>	Distracted						
Alert	<input type="radio"/>	Drowsy						
Active	<input type="radio"/>	Passive						
Excited	<input type="radio"/>	Bored						
Satisfied	<input type="radio"/>	Frustrated						
Successful	<input type="radio"/>	Failure						
Comfortable	<input type="radio"/>	Uncomfortable						

	not at all	1	2	somewhat	3	4	quite	5	6	very	7	8	9
How difficult as the perceived challenge?	0	1	2	3	4	5	6	7	8	9			
Was child aware of adult approval?	0	1	2	3	4	5	6	7	8	9			
Was child aware of peers?	0	1	2	3	4	5	6	7	8	9			
Did child anticipate activity?	0	1	2	3	4	5	6	7	8	9			
Did child expand activity?	0	1	2	3	4	5	6	7	8	9			
Did child extend activity?	0	1	2	3	4	5	6	7	8	9			
Imitation intensity	0	1	2	3	4	5	6	7	8	9			
Performance accuracy	0	1	2	3	4	5	6	7	8	9			
Was child in flow?	0	1	2	3	4	5	6	7	8	9			

Comments:

Figure 1. Flow Indicators in Musical Activities form.



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