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It is with pleasure that we inaugurate the reprint of the entire seven volumes of The Quarterly Journal of Music Teaching and Learning. The journal began in 1990 as The Quarterly. In 1992, with volume 3, the name changed to The Quarterly Journal of Music Teaching and Learning and continued until 1997. The journal contained articles on issues that were timely when they appeared and are now important for their historical relevance. For many authors, it was their first major publication. Visions of Research in Music Education will publish facsimiles of each issue as it originally appeared. Each article will be a separate pdf file. Jason D. Vodicka has accepted my invitation to serve as guest editor for the reprint project and will compose a new editorial to introduce each volume. Chad Keilman is the production manager. I express deepest thanks to Richard Colwell for granting VRME permission to re-publish The Quarterly in online format. He has graciously prepared an introduction to the reprint series.

What Formative Research Can Do for Music Education: A Tool for Informed Change

By Liora Bresler

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In his chapter on methodological issues in the *Handbook of Research on Curriculum*, Decker Walker (1992) recommended a more central role for formative research in the field of curriculum studies. Formative research, or development research as it is called by some, is disciplined inquiry conducted in the context of the development and/or implementation of an educational product or program. Its explicit purpose is the improvement of either the products or programs under study, or of the developers' abilities to design and produce similar products or programs in the future (Walker, 1992).

In this paper, I argue that formative research can assume a critical role in improving the teaching and learning of music. That such improvement is timely has become all too evident (Leonhard, 1993; Stake, Bresler, & Mabry, 1991); whereas, programs and curricular materials in a variety of media and forms abound, their performance in classroom reality often fall way short of their promise. Rather than blame the "users" of these programs, their developers should critique the suitability of these programs for their intended use. Developers may want to incorporate into the development process of instructional programs a disciplined, systematic examination of their operation within the natural classroom environment. Such examination should focus on teachers' perceptions and adaptations of the materials to the existing curricula, as well as students' interactions and experiences with these materials. This examination, conducted by an expert researcher, a "connoisseur" (Eisner, 1979), could also engage in a critical reflection on the explicit and implicit goals of the program as they are manifested in the program statements, contents, and activities. Formative research addresses all the foregoing aspects.

In the next section, I present the key characteristics of formative research, situating it within the context of curriculum studies. The following sections include four examples of formative research in music education that cover a broad spectrum of materials and programs under study, targeted student populations, research methods applied, and types of collaborations involved. In all four cases, the ultimate purpose was the development of a better program in terms of contents, structures, pedagogies, and evaluation practices, whether development focused on computer software, a listening kit, an evaluation tool, or improved music instruction. The presentation of four studies in this paper centers

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around research goals, data sources, and methodological issues, exemplifying the contribution of formative research to music education.

Clearly, formative research draws on the pragmatist tradition. In addition, the examples chosen are conducted within interpretive paradigms and reflect constructivist assumptions as to the nature of reality. This interpretive pragmatist orientation is markedly different in its underlying assumptions and goals from the positivist tradition (Bresler, 1992), requiring alternative criteria for the appropriateness of research questions and methods. The paper concludes with a discussion of these criteria.

Formative Research: Characteristics and Context

Formative research can be distinguished from the dominant types of research, both qualitative and quantitative, in that it is conducted in the context of program development rather than academic context. Its primary goal is toward improving products, programs, or developers' abilities (Walker and Bresler, 1993). Thus, formative research is clearly applied rather than pure. Since it is concerned with improvement, formative studies inevitably traffic in value judgments and raise value questions. Sometimes the item being developed is a physical product such as a book, record, diskette, or packet of materials of mixed form and media. At other times, a program is being developed, that is, a certain performance or pattern of interaction.

The benefits of formative research often extend beyond the immediate product or program. When developers, both those working on the project at hand and others who learn about their work, become able to make better development decisions based on the research findings, then the benefits extend to future development efforts as well. Although this is not its primary purpose, formative research frequently contributes to the generation of theory (Walker and Bresler, 1993).

What distinguishes formative research from the informal inquiries that are the daily routines of any development project (such as reading a review of research related to the topic, talking informally to potential users or participants, or trying out an idea in a classroom to see how it goes) is its disciplined,

systematic process of data collection and analysis. Cronbach and Suppes (1969) defined disciplined inquiry as that which is conducted and reported in such a way that the argument can be painstakingly examined. "The report of a disciplined inquiry has a texture that displays the raw materials entering the argument and the logical processes by which they were compressed and rearranged to make the conclusion credible" (pp. 15-16). Shulman (1981) argues that what is important about disciplined inquiry is that its data, arguments, and reasoning must be capable of withstanding careful scrutiny by other members of the scientific community.

The idea that curriculum development should be guided by something more informed than tradition and popular opinion is widely accepted by the educational research community. Indeed, the call for a more inquiring approach to development has been issued over and over again by nearly every major figure in the history of curriculum studies (e.g., Bobbit, Dewey, Taba, and Tyler) (For more detail see Walker, 1992). Today, however, disciplined inquiry has been pushed to the edges of curriculum development efforts when it is there at all. Curriculum developers might review relevant research as part of their development and use the findings in their deliberations. Sometimes, they try out early versions of their materials in classrooms. The decisions that shape the plans and materials are thus guided in a general way by broad theoretical principles based on research, and there is usually an empirical check that the materials work as planned. But the crucial design decisions are mostly guesswork, and the check, if it arrives in time, brings only a global assessment of the entire network of decisions that entered into the design (Walker & Bresler, 1993).

Interestingly, it is the scholarly community which has voiced an increasing criticism of the monopoly of university-based research on the production of formal knowledge and its limited relevance, usefulness, and accessibility to the world of practice. Joseph Schwab (1969) was one of the early critics who claimed that curriculum was moribund because of its isolation from practice. An-

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other source of criticism was constructivists' ideas and qualitative methodologists who emphasized understanding of the perspectives of different participants and challenged the idea that the academic views were the only legitimate ones. As a result, recent studies of teaching and classrooms have attempted to incorporate the perspectives of those who are engaged in it, including practitioners and students (Bresler, 1993b). These changes of purpose and methodology are compatible with the ideology of formative research which is centered around practice and attempts to capture the perspectives of various participants: students, teachers, and program developers.

As the examples below illustrate, the relationship of formative research to theory can take various forms. Formative research frequently draws on scholarly literature for its conceptualization. It can lead to the generation of new theories which are rooted in specific programs and immediate, practical concerns. Because of the goals and nature of formative research, its audience includes practitioners as well as academics. Thus, the traditional dichotomy of production and consumption of knowledge is blurred as both groups cooperate in the generation as well as the use of knowledge.

Earlier, I noted the abundance of curricular materials in music education and how few of these are based on a systematic, disciplined inquiry. This, of course, is not to say that inquiry does not exist. The great majority of the empirical studies in music education, however, are conducted in order to test a theory, method, or principle. Few researchers focus on the process of program implementation, the ways in which teachers integrate materials into their curricula, and students' interactions, struggles, and rewards with the materials.

A related problem is lack of collaboration between researchers and practitioners. For example, our study of the arts in U.S. elementary schools (Stake, Bresler and Mabry,

1991) indicated that guides for music curriculum existed in many districts but were rarely used by teachers. A key reason was the lack of teachers' involvement with the production of these materials. Teachers complained that these curricular materials and guidelines rarely took into account teachers' perspectives and that these materials lacked recognition of classroom procedures and realities. Instead, these materials emphasized general prescriptions and abstract goals (such as the roles of the arts in the developing of the "whole person"). Typically these materials were not grounded in a realistic awareness of classroom constraints and possibilities, nor were they based on children's working habits. Because of these perceptions, teachers considered the materials lacking and of little use.

The problem, then, is twofold. There is a separation of the production of curricular materials from a disciplined inquiry immersed in classroom realities. There is also a lack of close, collegial relationships between researchers, developers, and practitioners.

Formative studies, as the examples discussed in this paper reveal, are based on collaboration among researchers, developers, teachers, and students; in fact, the researcher often assumes the role of developer and/or teacher. These studies reflect a diversity of goals, differ in their intended products and curricular materials, focus on different populations, and range from primary school through junior high to college level. Methodologically, the researchers brought a variety of lenses and assumed different relationships in regard to the project.

The first study was a collaboration between a university professor who was the project director, and four primary school teachers—one music specialist and three classroom teachers—in three elementary settings. The second study featured a reversed type of collaboration in which it was the music teacher who assumed the role of the principal researcher. She was responsible for the design, data collection, analysis, and the writ-

ing of the final report but was supported and aided by people from the local education department and university. In the third study, the researcher was the developer of the evaluation tool which was to be implemented into two classrooms in two different schools. She was a 20-year classroom teacher with an approach to music education pedagogy similar to that of the teachers whom she studied; this experience provided yet another link between research subject and researcher. In the fourth study, the researcher was an "outsider" to the setting and the program, focusing on students' interaction with computer software within a college-level music theory class. The primary collaborators were the students, sharing their experiences, working habits, and perspectives. The teacher and program designers provided their perspectives as well as useful contextual information.

In all four cases, the ultimate goal was the development of an improved program. Each study was planned as a multistage process. The first and second studies consisted of several short steps such as data collection and analysis, improvement of the program, and another set of data collection. The third and fourth studies consisted of intensive one-stage endeavors with the purpose of redevelopment and follow-up.

"Music in Use": A Collaborative Effort

"Music in Use" was a two-year project conducted in three Norwegian primary schools—two urban, one rural (Espeland, 1987). The team consisted of a university music teacher educator, three classroom teachers, and a music specialist. Students' ages ranged from 8-13. The program consisted of new principles and materials (textbooks and compact disks) for encouraging children to listen to music of many different styles — including modern instrumental and orchestral music, pop, and jazz.

Dissatisfied with existing methods of teaching music listening, Magne Espeland introduced the concept of "use" at the center of the project by using sounds/pieces of music as a basis not only for learning in music, but also for learning and activities in other expressive subjects. In this way, music was presented on a more equal footing with pictures (visual), movement (kinetics), and texts (verbal) in daily classroom life. The music examples were selected primarily for their intrinsic musical and educational value rather than for extra-musical value, such as serving other subject matters.

The study focused on the implementation of the classroom program. Data sources included classroom observations, observations of videotaped activities, teachers' diaries, and many discussions. The report (Espeland, 1987) weaves in relevant historical accounts of music education, theories on music exploration, on listening, and processing of music, providing a conceptual and theoretical framework to the study. Thus, development was based on the interaction between existing theories and educational beliefs on the one hand and careful observation of children's musical behavior on the other.

As a tutor at a College of Education, Espeland had often been faced with teachers' criticisms of underestimating the importance of planning and strategy in the classroom. In "Music in Use," strategy was obviously of vital importance because the kind of responsive listening Espeland tried to develop in this project was an educational process taking the child through different stages.

To develop a method for music listening within a liberal education tradition, the researchers placed the children in listening situations where they could learn for themselves by placing greater emphasis upon exploring, creating, and problem solving than on formal instruction. In this way, activities in language, movement, and visual arts formed a basis for dialogue between teacher and child for discussion, for questions, and for guided assessment of the music. One striking aspect of this type of responsive listening had been the children's requests for repeated hearings (which required the use of relatively short music examples). This was explained by the teachers' emphases on the linking of products and processes with musical events in the music.

The educational reason for this selection of short pieces was not only that short pieces of music provide very good opportunities for repeated hearings, but also that good music,

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if considered as a kind of information, is usually rather complex, "packed with information" (Meyer, 1967). This, wrote Espeland, is probably even more so to the ears of primary school children who very often have nothing but commercial music as their referential framework.

Another important criterion for the selection of music was that of contrast. Espeland stated that music with striking contrasts in dynamics, tempo, and instrumentation is appropriate music in children's education because it demonstrates the "means" of music so clearly, and because contrasting music usually is so clearly reflected in the children's own expressive activities.

Activities designed for Associative listening (A-listening) aimed to utilize the children's associations and flow of imagery when listening to the music, whereas Structured listening (S-listening) aimed to focus children's listening directly upon the structural elements of the music, the musical events themselves (e.g., through the use of graphic notation). In the curriculum development, however, Espeland and his colleagues made a point that A-listening should never be separated from an accompanying period of S-listening, whereas S-listening could stand by itself or be followed by A-listening activity. They wanted to be sure that the listening, at some point, focused solely on the music itself.

Observations revealed that the teacher's ability to ask the right questions was central. It was vital to direct the child's attention toward the music by asking questions like: What in the music made you stop your circular movement right there? Why have you chosen to use such dark colors? What is the music like after the introduction? The researchers were surprised at the strong motivation of the children and by the fact that the type of music — modern or old, classical or popular — seemed to be of minor importance for children's acceptance and interest

as long as the "music in use" concept was the basis for the activities.

The study illustrates the key characteristics of formative research in several ways. Research was clearly applied, concerned with the development of curricular materials for listening activities. The concept behind the curriculum was based on learning theories in music as well as on theories from the field of psychology of music. The research, a collaborative effort between a researcher and classroom practitioners of various music ability levels, focused on children's interactions with the materials and their musical learning. The university professor brought the basic idea and the framework, whereas the teachers modified it and "filled in" with practical suggestions (e.g., how long the different sequences take; how to organize an activity). They also contributed extensively by describing their practice in such a way that other teachers could understand and adopt it to their own settings. The variations in students' ages and school settings served to strengthen the applicability of the study.

Assessing Listening: The Teacher as Researcher

The second example of formative research (Hibbert, 1989) was an action research study conducted by a teacher who assumed the role of a researcher in her own classroom. Pamela Hibbert, a music specialist in a junior high school in England, attempted to discover ways of improving her own curriculum planning, teaching techniques, and assessment procedures. She was aided by a university faculty member, but the responsibility for the design, data collection and analysis, and the writing of the report was hers.

Hibbert's motivation for the study was her concern about having too many goals within too short a time for her music classes (30-minute periods) for effective teaching. With the school timetable and priorities, music often "went by the board." Given this short time

allocated for music instruction, it was tempting to try to cover too much each session.

Like Espeland's study, the focus of Hibbert's program involved listening. In building a conceptual framework for listening, Hibbert referred to several ways of listening to music, each for a particular purpose (but not mutually exclusive). These included:

- listening in order to stimulate another activity, e.g., dancing or painting;
- listening in order to repeat or perform a piece;
- listening to compare, alone or in a group; and
- listening to and analyzing musical information.

She wanted to examine further aspects of listening situations which would help her to understand how students develop aural responses and apply musical perception, and are thus enabled to gain listening skills. She suspected that much of the content of her teaching was dominated by musical elements which are easily assessed such as pitch and rhythm, and neglected other important aspects of music.

During the course of her study, Hibbert observed precisely how the children listened and the corresponding results by isolating elements of the curriculum. Over a period of two terms, she monitored a class of "top juniors" (ages 10-11) whom she saw once a week, by tape recording lessons and discussions with children, by notes from her own observations, and by notes from an outside observer. Examples of classroom activities included listening to pieces of music where no overt physical response (i.e., playing or writing) was required, answering questions verbally or writing answers to a listening exercise, e.g., identifying pulse, and creating compositions as a group. She selected one lesson from each series to try to illustrate the sequence of development.

A close study of the lesson transcript and of an outside observer's notes indicated what Hibbert had suspected: The first lesson contained too much material to handle satisfactorily in terms of identifying how children listen. In Hibbert's judgment, not enough detailed attention was given to any one aspect, such as the identification of instruments. The children were no sooner settled into one aspect of the lesson than she moved them on to the next. In terms of content and pace, she had fallen into the classic trap often experienced by the music teacher who has only half-an-hour a week per classroom.

Other problems became apparent upon scrutiny. The disruptive boys grouped together, and two girls who had recently come to live in England did not respond with interest to exercises based on Western nursery rhymes. The girls were adept at depicting the percussion instruments and later, playing bells and maracas. Hibbert reflected that she should be more conscious of making the content of music lessons appropriate and relevant to individual backgrounds and preferences. As a result of her study, Hibbert modified her teaching. The second session's content was much simpler and more effective. There was time to work in a more relaxed and detailed way on a single element before moving on, in Hibbert's terms — "marked contrast to the frenetic activity of the previous session" (Hibbert, 1989, p. 181).

For the composition sessions, the groups had been sent to various corners of the school. Hibbert had circulated with the tape recorder but had avoided giving too much guidance. Her first reaction in listening to the opening few minutes of the first tape was one of dismay. What initially had sounded like random playing and argument, however, proved to be the composition process in action. The other tapes reflected a similar pattern of playing and experimentation until the group members discovered and selected the material that was satisfactory to the majority. In each group a leader emerged (usually a girl) and as members settled down to their tasks, they negotiated with each other, discussed what they had played, and suggested alternatives. Once a basic idea met with approval, it was tried many times with various additions until the children reached what was for them a pleasing result. The resulting pleasure and satisfaction seemed to Hibbert to be one of the most important reinforcing principles of this kind of work.

Most of the children commented afterwards that it was essential to listen to each other's parts for the composition to work. They as-

sessed each other's work both within the group and later in the play-back sessions. This was recognized as a critical element in their own success or failure. With one or two questions from Hibbert (i.e., What do you think was good about group X's piece? What did you like? What do you think could be improved?), the children were able to offer valid comments informed by their own experience.

Hibbert's embarking on the process of research resulted in a change in her pedagogical beliefs. She concluded that:

> It is not necessary or possible or desirable to include every element of musical activity as separate entities in every music lesson ... In composing activities, the children were assessing themselves. Because all had participated they felt qualified to comment upon each other ... Getting children to be creative first and then introducing them to the compositions of others seemed to be a better way of addressing the common complaint that children don't listen, which, in turn, stimulated a fundamental change in teacher behavior and teaching style. (Hibbert, 1989, p. 185)

She found in that context an approach through composition was most rewarding and relevant to pursue as a means of improving listening skills. Once children have discovered the various sounds and rhythm patterns available to them, they can go on to put them together in their own compositions and, hopefully, progress to appreciating the compositions of others and the more conventional methods of composition.

By observing the way the children behaved and by listening to them during the composing process, it was possible to assess their grasp of musical concepts derived from listening. The children assessed themselves: They listened to each other, and their own experience of composition enabled them to comment on work undertaken by others. Methodologically, the study manifested that an experienced teacher's judgment via observation carried out during practical music-making sessions can be a useful method of gaining knowledge toward the redeveloping of one's own teaching.

Hibbert's questions addressed practical, local "how to" issues, directly concerned with improving her classroom practice. She conducted an extensive and systematic data collection and analysis and drew upon rich experience with students and classroom dynamics. As her final discussion manifests, the practical questions evolved into broader issues with important ramifications for a theory of teaching and learning rooted in practice.

The comparison between Espeland and Hibbert's study reveals that even though both chose listening as the central curriculum focus and emphasized student-centered, active responses, each study resulted in the development of entirely different materials and programs. Indeed, there are many ways to create high-quality materials that are effective for musical learning. Ultimately, it is the developer's vision, beliefs, and abilities that give the program its general direction. These directions, in turn, are shaped and modified by the examination of classroom reality.

Student Evaluation Framework: The Researcher as a Developer

In the third example, conducted in a midwestern American town (Brummett, 1992), the researcher carried the role of the developer of an evaluation tool for the music education classroom through its examination in two generative music teachers' classrooms. Verna Brummett created the Interactive Evaluative Framework which was offered as an option to traditional means of assessment in the sixth grade general music class. The framework [based upon the Generative Approach to Musical Learning as developed by Eunice Boardman(1988)] emphasized the teaching-learning-evaluating continuum balanced with the need to share students' musical development with parents and administrators. In designing the strategies and selecting materials and types of activities, Brummett drew on her twenty years of extensive experience as a music educator. She wanted to explore how the teachers applied the framework within their general music classrooms. She focused on teachers' modifications of the framework before applying it within selected sixth grade music classrooms as well as on their reactions during and following implementation. She explored the extent to which teachers will use a structure that allows for continuing evaluation of process and successfully adapt it for their own

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music programs in less-than-optimal situations. Supporting considerations included the nature and degree of student-framework interaction, the nature and degree of student-teacher interaction, and the framework's viability within the respective music programs.

Brummett conducted an in-service seminar with the two teachers as preparation for implementing the evaluative framework which she carefully documented. Additional data included:

- field notes and audio tapes from classroom observations;
- teacher, student, and administrator audio-taped interviews;
- teachers' logs;
- students' processfolios; and
- district-wide documents.

Triangulation was achieved through observations, interviews, and examination of documents during a time period of seven months.

During each on-site visit Brummett interviewed two students chosen by the music teachers from the selected sixth grade class at each school. Students were selected on the bases of gender, scholarship, and general interest in music. The findings revealed that students preferred classes centered around musical performance and creative endeavors in an environment which encouraged self-discipline and self-direction. Self-evaluation and reflection seemed to be important aspects of their total learning environment.

The teachers identified the most salient characteristics of the Interactive Evaluative Framework as its flexibility for use with their curriculum and in their respective music programs, flexibility for full class or small group approaches, focus on holistic evaluation as part of the teaching-learning-evaluating continuum, and emphasis on developing students' musical independence.

The students' processfolios were found to be manageable for the selected classes. The teachers, however, shared their frustrations with several aspects of the framework and suggested certain recourses and solutions to the aspects which they found problematic.

These negatives included: time frame for completing the Evaluative Strategies (the teachers suggested that a partial checklist be added to the students' reflection sheets "to speed up the process"); students' difficulty in writing reflective responses; and unavailability of the Holt student books from which musical examples had been drawn. The teachers in the study elected to revise those strategies which used the Holt musical examples by inserting selections from their own books and students' repertoire, using other sample strategies which did not include songs or listening from the Holt series, and creating their own strategies. While not having access to the Holt series might have been inconvenient, the teachers' revisions and adaptations helped to validate the Interactive Evaluative Framework's usability beyond those classrooms that use the Holt music series. The "Musical Progress Message," (Brummett, 1992) although not identified as negative, was not incorporated into the study by the two teachers. Because they had a reporting system in place, this added reporting method was perceived as unnecessary.

The teachers organized the processfolios without difficulty and found them to be a valuable part of the Evaluative Framework. They speculated, however, on the difficulty of using individual processfolios for all their students or even for one grade level. One teacher suggested having folios for small groups within a class. This would be more manageable and could provide more individualized data than a class processfolio.

The third emergent theme embodied in the teachers' messages was the emphasis on students' musical independence. The Interactive Evaluative Framework espoused the learner's musical independence as a primary objective. Generative classrooms are student-centered rather than teacher-centered. Thus, the classroom climates in this study had direct bearing on the framework's implementation. The supportive classrooms provided an atmosphere in which students took

some responsibility for their musical development, and teachers acted as guides to nurture that development.

Like Espeland's project, this study provides an example of formative research starting from the early stages of developing the curricular materials to evaluation of their implementation. Here, too, the developer was responsible for the design of the product, the in-service, and the research drawing extensively on teachers' help and collaboration by implementing, observing, and making suggestions for improvement and modifications throughout the study. The report (Brummett, 1992) was the first step in the development of an evaluative framework. A second stage of development is currently in progress.

The Implementation of a Computer Program in a Music Theory Class: The Researcher as an "Outsider"

I explored the implementation of computer-based instruction in an introductory music theory class in a private American university (Bresler, 1987; see also in Bresler & Walker, 1990). My background included college-level music theory teaching experiences, teaching with computers at a university level, and expertise in curriculum research. The motivation for the study stemmed from my interest in the claims about the merits of computer software for music instruction. Similar questions have been voiced by music educators within the computer industry as well as by music education scholars. Many referred to software's potential revolutionary effects on music instruction. I was interested in examining the implementation of music software into the curriculum as well as students' interactions with it.

I chose a "representative" music software that consisted of music theory and ear training of basic musical units such as scales, intervals, and chords. The setting was chosen as a promising one. The computer program was designed and written with the specific audience of the classroom in mind by a professor who had taught that particular class. There was a perfect match between the contents of the program and the contents of the classroom curriculum, focusing on the basic musical elements of scales, intervals, and

chords. The program afforded individualized instruction in a class where the diversity in students' musical background was extreme. Drill exercises included in the program required the active involvement of the user and were more effective than a class setting where questions were answered by a few "professional" volunteers. Last but not least, the computer environment was free from peer pressure and competition, whereas many students were self-conscious in class.

I primarily employed qualitative methods and, to a lesser extent, quantitative methods to explore contextual aspects and capture participants' beliefs and perceptions of the innovation. Data sources included:

- observations of all 27 music sessions;
- observations of all the individual sessions of the 17 students who worked at the computer;
- open-ended interviews with the classroom instructor, the two software designers, and with 20 students (two-four times with each, at different stages of the study);
- examination of written materials including course syllabus, quizzes, the answer-books, textbook, classroom and computer scores; and
- two sets of questionnaires distributed to students at the beginning and at the end of the quarter.

The lenses I brought to the study were borrowed from music theory, educational computing, and curriculum.

The use of computer software had substantial impact on the learning of some students. Common characteristics of these users were the ability to self-diagnose learning difficulties and resourcefulness in overcoming them, analytical thinking, and systematic working habits. The most striking characteristic, though, was that all students who continued to work with the computer beyond the first time were those characterized as "nonmusical," those who were not engaged in musical activities outside the classroom. I found that many of the features of the software were more troublesome for the musically experienced, as compared with nonmusical students. Such features included poor sound quality, the presentation of isolated musical elements of scales and chords (as contrasted with "real" musical units like musical phrases and melodies), and an interface that was

based on typing rather than "playing" music. In addition, the musical students had an option — a real instrument on which they could practice.

The intensive observations of students who used the program, the study of their learning styles and problem-solving strategies on the one hand, and their musical and general backgrounds, expectations and out-of-school activities on the other, served to create a personal profile that identified the match and mismatch between these individuals and the program. The observations of the class sessions pointed at curricular issues related to course goals, pedagogical style, and climate which affected the integration of the computer into the existing curriculum. On the institutional level, the study discerned problems associated with the introduction of innovations which required teachers to change behaviors and often attitudes and beliefs concerning their educational goals and pedagogical styles. These findings were communicated to the designers of the program as well as to the music department and instructors of music theory in that institution.

This example of formative research alerts us to problems when the research is conducted at a relatively late stage of development. In addition, the findings proved to be less constructive to the program developers in that they questioned the basic assumptions underlying the music software. Findings also brought into question the assumptions underlying the classroom music curriculum. One can argue that the insights gained from students are important and that incompatibility of values between program goals and those stated in the course's intended curriculum have important theoretical ramifications. Yet, from the standpoint of formative research, this was less conducive to the immediate improvement of this particular program in this particular setting. Hence, the significance is to future rather than to immediate developers.

Discussion

Formative research comes in many shapes and forms. These four examples illustrate the wide range of programs, encompassing computer software, curricular unit including compact disks and text, an evaluation framework, and instructional activities. The stud-

ies were initiated and conducted at different stages: prior to development (Hibbert, 1987); from the inception of the program (Brummett, 1992; Espeland, 1987); and when the program was already in operation (Bresler, 1987). The methods were responsive to settings and issues, as well as the targeted student population, the situation, and the specific program. Research sites ranged from one to three. Data sources included nonparticipant and participant observations including situations in which the researcher had a key role. Participants' perspectives were collected by open-ended and semi-structured interviews, structured questionnaires, teachers' diaries, discussions with teachers, and think-aloud strategies of students working on musical problems. Most methods focused on students' and teachers' actions in a narrowly defined situation related to the developed program; but, at times, background information proved to be highly relevant. Institutional factors played various roles, as did the more extensive probing into students' musical experiences, aspirations, and learning styles. Typically, data were documented in audio and video tapes.

The range of research issues and foci necessitated different kinds of collaboration and focus. In "Music in Use," (Espeland, 1987) the prime responsibility for the development of the materials, the design of the project, and the writing of the manuscript lay with a university professor; whereas in the Evaluation Framework, the principal investigator was an experienced music teacher working on her dissertation. In both of these cases, the researchers relied on the teachers who implemented the materials in their classrooms for extensive feedback on their perceptions of the programs in operation. The action research study manifested a reversed collaboration in that it was the classroom teacher who was responsible for the development of the program (in this case, her own instruction), the design of the study, and the writing of the report. The collaborator was a university person who helped with observations to provide an "outsider" view. Finally, in the computer project, the researcher was a music theory teacher in an academic setting and the collaborators were the teacher, program de-

signers, and the students in the class. These various collaborations defined the research methods and ultimately shaped the data and the knowledge gained in the research.

Knowledge as Related to Theory and Practice

The issue of knowledge and its relationships to theory and practice is a central one in formative research. Knowledge implies description, interpretation, and critique along particular dimensions. The aforementioned studies manifested various levels of critique, each with its respective educational values and implications to music education.

In their discussion on action research, Gore and Zeichner (1991) provide a useful framework in their conceptualization of *technical rationality*, *practical rationality*, and *critical rationality*. They define *technical understanding* as concerned primarily with such aspects as orderliness and discipline within the classroom, to which I would add other aspects such as success in standardized tests, time, investment, and efficiency. *Practical rationality* is concerned with activities encouraging student understanding and processing of music. All aforementioned studies acknowledged the importance of the technical and practical aspects in their examination of the different programs. *Critical rationality* is concerned with assessment of which students are gaining the desired understanding, the meaning of *"success"* as related to specific goals, institutions, expectations and norms, and the issue of whose perspectives are represented in that which is being understood (Bresler, 1987; see also Bresler, 1993). One may argue that the technical and the practical are often the most useful to immediate developers, whereas the critical, which questions the basic assumptions on which the program is based, may be more useful to future developers. Because formative research is holistic and focuses on different dimensions of the program, it is appropriate to combine two or all three of these aspects.

Finally, criteria for merit and significance are important. Of primary significance is the contribution of the research to the development of programs and instructional materials, the relevance of issues and findings to practice, and their applicability to a variety of settings and contexts. Because formative research is pragmatic, efficiency and economical considerations are also important. The methods of formative research, while often more comfortably fitted within the qualitative, naturalistic research tradition, pose distinctive methodological challenges. The definition of formative research as a disciplined inquiry requires that we consider criteria relating to truth-value and applicability (Lincoln and Guba, 1985).[1]

The following are issues to be considered in the conduct of formative research:

1. *Truth-Value (Triangulation)*. How to confirm interpretations of what students did, experienced, and learned? How to confirm causal accounts relating program elements, circumstances of the situation, and learning outcomes?

2. *Applicability*. How to tell if the situation selected for study is a good one? To what range of students and situations can the findings of the study be applied? How to know whether the observations made and questions asked are the most relevant and important ones?

Because formative research is pragmatic, researchers are also concerned about the appropriate trade-off between the cost of the study, including time and effort, and the value of the knowledge gained for the developer and the wider community. Good formative research will use methods that resolve these problems better than other available methods can.

Truth-Value: The findings of qualitative research are open to confirmation through triangulation (Denzin, 1970).[2] Readers can replicate the observations the formative researcher reports by making similar observations in similar situations. The researcher is not content to note available confirmatory evidence but deliberately seeks new facts that might refute the presently accepted facts (Popper, 1969). Important facts are always, in some degree, interpretations of meanings and these may differ from observer to observer. The researcher triangulates the observations, working toward some common perception, but expects and reports on certain differences in perception, such as differences in perception between students, university researchers, and teachers. The researcher is

careful to relate certain ways, with background and value commitment showing, used to interact with the scene and arrive at assertions. Thus, confirmability is an aim, not an ideal, to be tempered by the contextuality of reality and focusing on questions that matter. The researcher can do much to increase the quality of the research process but it serves no more than to facilitate cautious and insightful use of findings.

The question still remains of how to ascertain whether or not the situation selected for study is a good one. The concept of "objective truth" does not hold up in interpretive paradigms. Walker and Bresler (1993) suggest that a good choice in this context means one that has the most potential for findings that will inform development, one where the most important features of the program can best be observed in action. As the examples in this paper manifested, this was done by drawing on practical experience as well as on theory. Authentic situations, those that define the educational problem addressed by the development effort, are the preferred choice. Artfully contrived situations may sometimes yield insights not available in authentic situations, but they always create a problem of determining whether findings will apply to authentic situations. Insights gained from studies in contrived situations should be checked in authentic ones. Accessibility is the key: where the phenomena can readily be observed extensively, and where informants are able and willing to collaborate. Situations that are often strategically significant include typical situations, such as ones for which the program is designed (Hibbert, 1989). Extreme situations include: best case (Brummett, 1992), promising case (Bresler, 1987; Espeland, 1987), but also worst case. Thus, situations are selected for convenience and accessibility as well as their informative potential. Often a great deal is to be gained from systematic, planned comparison of similar and contrasting situations (e.g., Espeland, 1987).

In the process of confirming or refuting findings, Walker and Bresler suggest comparing students' actions and experiences in situations that differ in ways that the model sug-

gests should affect outcomes. The researcher should then check to see if outcomes differ, intervening and observing whether students respond as the model predicts. Discussions of observations and questions by peers and informed members of the community are essential. The judgment of the relevant community of music educators with situation-specific expertise (i.e., music teachers, developers, and academics) is as close as we can come to an ultimate arbiter. Member checking (soliciting feedback of collaborators and participants on the reports) is not only ethical but invaluable in the insights to be gained. It is also inexpensive. Replication of observations by others with different preconceptions can be extremely useful when possible.

The ultimate test of the validity of such models is the test of practice: Does the program, when put into practice, work as the interpretation says it should? The test of practice, however, is not definitive. A program may work for different reasons than the researcher supposes, and it may also fail for different reasons than the researcher supposes. It is still a stringent test, and no more definitive test of the educational value of programs has been devised. The weak form of the test of practice: Does the program work in the hands of program advocates using educators they select in situations they select (e.g., Brummett, 1992; Espeland, 1987; Hibbert, 1989)? Most educational programs work, to some extent, in these situations. The strong form of the test of practice: Does the program work in the hands of educators under actual prevailing conditions in schools and universities? Few formal educational programs have ever been documented to work as their developers planned in the full-range educational situations found in U.S. public schools. Success, by this standard, is modest at best. One recommendation, then, is that follow-up of formative research should include "average" and "worse" cases (Walker & Bresler, 1993).

Applicability: Formative research attempts to examine programs in their local settings, to document their operation in a natural environment rather than an experimental one, to understand the multiple per-

ceptions of those who use the program, and to include contextual factors whenever they are relevant. What is true for one context, however, may not be true for another, given differences in student population, teacher characteristics, and institutional priorities, to mention examples of aspects manifested in the examined studies. In order to claim wider applicability, it may be useful to conduct similar studies in markedly different locations to assess the potential for transfer.

Since formative research is contextual and naturalistic, development researchers build upon the uniqueness of personal understanding, offering a credible account and a vicarious experience. Researchers also ask each reader to incorporate the account into prior experience and belief. By reporting the kind of detail that enables readers to bring their developed faculties of judgment into play, it facilitates inferences by the reader regarding other situations. Readers transfer insights from a study to other situations based on the similarity they perceive between the situations, intuitively weighted as to what is important and unimportant in the match.

To what range of students and situations can the findings of the study be transferable? The more general the findings the better, from the standpoint of informing development. The depth and intensity of the study, however, limits it to small numbers and reduces its applicability power. The dimensions along which generalization should be expected to fail include: student characteristics (e.g., ability, background, goals); teacher characteristics (e.g., beliefs, pedagogical skill, expertise, motivation and involvement); and setting characteristics (e.g., resources, community values, priorities). It is important to study situations that reflect the naturally occurring range of these characteristics. According to Walker and Bresler, little effort should be devoted to estimating variation along these lines until and unless the researcher encounters a difference in responses associated with differences in these characteristics.

Formative research should feature intensive case studies of small samples. Developers have little more to learn by increasing sample size beyond the handful of subjects that can be economically studied within the time constraints of the development. If interesting findings emerge from studies of a few cases, they should be tested by building programs based on them and testing the programs in other intensive studies of a small number of cases.

The examples presented here illustrate issues involved in formative studies. Formative research can contribute to the improvement of the programs and materials by helping us gain insight into ways to improve music teaching and learning.

Curriculum development and curriculum research have much to gain from a revival of the tradition that casts research into a more central role in curriculum development. This tradition still lives and, as our examples testify, has borrowed extensively in its conception and methods from the qualitative paradigm. Research which delves into the minute details of students' experiences and teachers' interactions with the curriculum can, primarily, inform developers to improve products, programs, or developer's abilities. Ultimately, formative research serves to tie theory and practice in a way that benefits both.

Acknowledgements

Notes

1. A comprehensive account of methodological issues which are more problematic in formative research than in general education research is presented in Walker & Bresler (1993).

2. The term triangulation was coined by Webb et al. (1966), an internal index to provide convergent evidence, "the onslaught of a series of imperfect measures." Triangulation is supposed to sup-

port a finding by showing that independent measures (checking with different sources, applying different methods, corroborated by different researchers, and examined through different theories) of it agree with it or at least, don't contradict it.

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