THE ORIGINS OF JRME: A RETROSPECTIVE ACCOUNT

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Introduction

This article presents a history of the origins of the *Journal for Research in Mathematics Education* (JRME) published by the National Council of Teachers of Mathematics (NCTM). Written by three of the many persons responsible for initiating the journal, this account is based on minutes of meetings, notes from files, and personal recollections of the events and persons involved in the deliberations over a quarter of a century ago. David C. Johnson, then at the University of Minnesota, was the first editor of JRME (Volumes I to IV). Thomas A. Romberg was Chair of NCTM's Research Advisory Committee, which wrote the proposal arguing that a research journal was both needed and an appropriate publication for NCTM to undertake. Joseph M. Scandura was the editor of *Research in Mathematics Education*, a special NCTM publication designed to determine the feasibility of publishing a research journal. We are confident that this retrospective account in general captures the issues and events leading to the decisions to start JRME.

Now that JRME is celebrating its 25th anniversary and has become a major research journal in American education with over 11,000 subscribers, it may be hard for many to understand why there was controversy about the need for a publication in mathematics education research. Although suggestions that NCTM should publish such a journal had occurred sporadically for several years, the decision to undertake the effort was in response to a proposal prepared in 1967 by the organization's Research Advisory Committee (RAC) and approved by the Board of Directors at its meeting in January, 1968. The members were split in their support of the proposal, with the deciding vote cast by NCTM President Donovan A. Johnson. This vote reflects the fact that the origins of JRME were surrounded by concern and controversy. In recounting the events that led up to the decision to publish a research journal and the details of starting it, we have chosen to focus on four topics:
1. Mathematics education in the 1950s and 1960s

2. The establishment of the Research Advisory Committee

3. The publication of Research in Mathematics Education

4. The initial structure, policy, and procedures for the new journal.

Mathematics Education in the 1950s and 1960s

Although research on the teaching and learning of mathematics has a long history, a number of events in these decades were significant stimuli for the conduct of research. In his recent chapter, "History of Research in Mathematics Education," Jeremy Kilpatrick has labeled this era "The Golden Age" for research in the teaching and learning of mathematics (1992). It was during this era that mathematics education came of age as a specialized field of study with a growing community of persons involved.

There are many reasons for this emergence. First, as Kilpatrick has pointed out, in the early to mid-1950s, "American schools were under attack from business and the military for graduating young adults who lacked basic computational skills, from colleges for failing to equip their entrants with a knowledge of mathematics adequate for college work, and from the public (agitated by a host of critics from Arthur Bestor to Hyman Rickover) for having watered down the curriculum in response to progressivism and life-adjustment education" (1992, p. 24). For many persons it was assumed that scientifically derived empirical data needed to be gathered to support or refute these attacks.

Although for school mathematics the primary response to these criticisms was the development of the "new math" curricula of the 1960s, there was a realization that "curriculum revision strikes at only one side of the trouble in mathematical education. Much more needs to be known about the mental functioning of children who are expected to pass through the curriculum and about the teachers who are expected to operate it" (Dyer, Kalin, & Lord, 1956, p. 26). Thus, the need for more theoretically oriented research on the teaching and learning of mathematics, if the mathematics
education community was to respond to the critics, was recognized.

A third stimulus was increased Federal support. In 1954, for the first time, the U.S. Office of Education had been empowered to fund research projects via the passage of the Cooperative Research Act. Then, in 1963 the Federal involvement in research was significantly expanded with the passage of the Elementary and Secondary Education Act (ESEA), which increased the funds for research, expanded the types of studies that could be funded, authorized the establishment of educational research centers to conduct programmatic research, and required development projects to conduct evaluations of their efforts. Additionally, the National Science Foundation (NSF), which during this period primarily had funded curriculum development projects, began to request formal evaluations of student performance when students used those materials. NSF also funded the National Longitudinal Study of Mathematical Abilities, which involved one of the largest data-gathering efforts ever undertaken in American Education.

Still another stimulus was the expansion of graduate programs in mathematics education, in large part a consequence of funding from the National Science Foundation, for academic and summer institutes for mathematics leaders. Institutions, such as Stanford University, the University of Wisconsin, the University of Illinois, Ohio State University, and others, began to shift from programs designed to educate persons to teach mathematics and methods courses for prospective teachers to programs designed also to prepare them for a research career on the teaching and learning of mathematics.

The outcomes of these and other initiatives were that by the mid-1960s there was a growing number of scholars conducting research on the teaching and learning of mathematics. In fact, mathematics education began to be recognized as an important area of scholarly inquiry. However, research in the
field lacked coherence, and investigators lacked professional identity. It became apparent that if scholars were to flourish, they needed to be able to share their ideas and the results of their investigations. Thus, suggestions were made by several individuals to initiate research-reporting sessions at conferences, hold meetings to summarize research, and to start a journal that would report their research.

At that point in time, no organized meetings were regularly held and only the two NCTM publications, the Arithmetic Teacher and Mathematics Teacher, along with School Science and Mathematics, served as the main mathematics education outlets for reporting on research studies in the teaching and learning of school mathematics to the "wider" community. Also, many members of NCTM’s Board of Directors felt that research papers, with a background literature review and detailed presentation of the research design and data analysis, were not really appropriate for its journals.

This is not meant to say there were no other outlets, but rather that the opportunity for presenting the results of an individual study to other researchers and graduate students was limited to selected summary points in special issues of journals and books or monographs. Some quite influential items were the special issues on mathematics of the Review of Educational Research (RER), published by the American Educational Research Association; for example, the RER of October 1957, with its focus on the Natural Sciences and Mathematics, included extensive reviews on such topics as:

"Mathematics in the Elementary Grades," E. G. Gibb and H. Van Engen (pp. 329-342), with some interesting points regarding problem solving (p. 334), and mental arithmetic (pp. 334-5); and
"Implications of Research in the Psychology of Learning for Science and Mathematics Teaching," D. A. Johnson (pp. 400-414), with observations regarding concept learning; for example, "learning takes place somewhat in proportion to the involvement of the learner in learner activities" and "the role of the teacher as a guide or participant in pupil-teacher planning stimulates learning" (p. 402), as well as substantial sections on "motivation" and "emotion."

The RER, of June 1961, also focussed on the natural sciences and mathematics and included:

"Mathematics in the Elementary School," H. F. Spitzer and P. C. Burns, an update (pp. 248-259). In the subsection on "Research on Teaching Methods," the authors note that the "use of thought-provoking review study questions produced superior learning and that teachers favored these questions" and "estimating answers . . . led to thoughtful analysis, with resulting better understanding" (p. 251).

The same theme, the natural sciences and mathematics, was again picked up in the RER of June 1964. Here we have:

"Mathematics in the Secondary School," D. J. Dessart (pp. 298-312). Dessart makes note of the long term—i.e., five year—program of research linked to the work of the University of Illinois Committee on School Mathematics, UICSM; and

"Methodology of Educational Research in Science and Mathematics," M. Belanger
(pp. 377-395)—in which the author points to the concern for "conceptualization" and "contexts of educational research" and makes the point that educational research has different meanings for different people; he also addresses the debate regarding "basic research" versus "applicability to immediate school problems" (p. 375). The paper further pointed to the need to link work with that of the behavioral sciences and the importance of "conceptual models" and "theory development."

In summary, by the mid-1960s, there was a growing climate supporting research on the teaching and learning of mathematics and a recognized need for ways researchers could share their ideas and work with others. In particular, the somewhat intermittent nature of other publications made it obvious that the research community in mathematics education needed a regular outlet in order to provide its members an ongoing forum for informing each other of developments and for debate. At issue was who would sponsor such interchanges. Although many persons felt that NCTM was the obvious organization to take on this responsibility, many leaders in the Council were unsure that the organization should sponsor activities for a "special interest" group of its members.

Research Advisory Committee

To respond to the growing interest in research in the teaching and learning of mathematics, NCTM’s Board of Directors appointed a formal Committee on Research in Mathematics Education at its April 20-23, 1965 meeting (NCTM, 1965, p. 7). One of this committee’s charges was to look into the possibility of publishing a research journal.

This was not the first time NCTM had had a committee to advise it on research in mathematics education or to consider publishing a research journal. For example, in 1956-57, an earlier
committee had been charged "To provide [a] research section at [the] convention; to prepare and provide means of collecting and publishing research. To consider establishment of [a] supplement to Mathematical Reviews to contain "World Review Research" in mathematics education" (NCTM, 1956, p. 570). However, this committee was disbanded and the idea of establishing such a committee to advise the Council on research or to publish a research journal was not seriously considered again until 1964.

The second effort to establish a research committee took place at the April 21-24, 1964 Board meeting, in response to a letter from E. G. Begle of Stanford University to NCTM President Frank Allen, dated March 31, 1964. Begle suggested that NCTM sponsor a research conference:

I believe that a conference, bringing together as many people as possible who are interested in research in mathematics education, could be very helpful. At such a conference we could review what is now going on, try to find those research areas which seem the most promising at the moment, and explore the possibilities of cooperative efforts which might enhance the value of the work done particularly by master's and doctor's degree candidates.

At its meeting, the Board passed a motion that the organization sponsor such a conference and suggested to the Executive Committee that an ad hoc committee be formed to develop plans for such a conference (NCTM, April 1964, p. 7).

The topic was again discussed at the Board's August 18-19, 1964 meeting. Following the meeting, President Bruce Meserve appointed a three-person ad hoc Committee on Research in Mathematics Education (consisting of Ken Brown, U.S. Department of Education; Boyd Holton, University of Florida; and John Wagner, Michigan State University) to report to the Board at its January 8-9, 1965
meeting. This ad hoc committee took its charge seriously. The committee report, while addressing the issue of NCTM holding a research conference, focused on the need for NCTM to establish a "steering committee for research" charged with three tasks: to hold a research conference, to provide research reporting sessions at conferences, and to consider the publication of a research journal. A motion to establish such a committee was passed with the stipulation that it "be formed with a life of five years, at which time the work of the Steering Committee would be reviewed before determining continuation" (NCTM, August 1964, p. 13).

At the Board's April 20-23, 1965 meeting, President Bruce Meserve announced that a Committee on Research in Mathematics Education had been appointed. This committee was to report to NCTM's Curriculum Committee. The six members of the committee (with their staggered terms) were Ken Brown and Boyd Holton (1965-66); Bud Trimble and Joe Crosswhite, both from Ohio State University (1965-67); and Eugene Nichols and Joe Scandura, both from Florida State University (1965-68). Crosswhite was invited to serve as chair for 1965-67.

During its initial year, 1965-66, the committee, renamed the Research Advisory Committee (RAC), focused its efforts on the question of how to convince Board members of the importance and viability of an NCTM research journal in mathematics education. At the Board meeting on August 24-25, 1965, the RAC suggested "that the Council should explore the potential usefulness of making a research journal available to its members. As a preliminary step, the committee proposes a special publication for free distribution to all members" (NCTM, August 1965, p. 10). A motion was made and passed to proceed with planning such a publication. Then at the December 3-4, 1965 Board meeting, a three-person subcommittee (chaired by Bud Trimble, with Joe Scandura, who had moved to the University of Pennsylvania, and Ken Henderson of the University of Illinois) were directed to
"prepare a manuscript by securing articles from various writers and submit the manuscript to the Publications Committee" (NCTM, December 1965, p. 8). This subcommittee asked Scandura to be editor of the manuscript and set about the task of preparing it. Because of the importance of this publication with regard to the eventual approval for publication of JRME, its intentions and contents are described in some detail in the next section.

During its second year, 1966-67, Pat Suppes from Stanford University and Bob Bechtel from Purdue University were appointed to the Research Advisory Committee to replace Brown and Holton. Work continued by the subcommittee, which prepared a sample issue of a research journal, Research in Mathematics Education (1967). The manuscript was published in time for the 1967 annual meeting. RAC decided that its major focus after publication of the sample issue would be to gather information about both the issue and opinions from experts in learning theory, teaching, and curriculum on the viability of an NCTM journal dedicated to research on the teaching and learning of mathematics. At its November 17-19, 1966 meeting, the Board authorized expenditure of funds to cover the cost of a questionnaire that would sample opinion on the research publication (NCTM, November 1966, p. 3).

In its third year, 1967-68, Tom Kieren from the University of Alberta and Tom Romberg from the University of Wisconsin were appointed to the committee to replace Trimble and Crosswhite. Romberg was asked to be chair of the Research Advisory Committee. The primary work of the committee during this year was: first, to carry out the survey of opinions about the research journal; and, second, to prepare a proposal for the Board for initiating the journal. The survey involved sending free copies of Research in Mathematics Education to 150 persons who had been identified as knowledgeable about educational research. Included in the mailing was a questionnaire that asked the person to read and judge each article and to respond to a series of questions about NCTM's intention
of publishing a research journal. Seventy-eight questionnaires were returned along with 16 letters from non-respondents, who indicated a lack of time to read and react to the questions but who supported any and all attempts to increase the publication of quality research. The survey results revealed that respondents felt the quality of the articles in the issue varied. Many respondents only judged certain articles, but, in general, reviewers thought that the collection was good and most would warrant publication in a refereed journal. Furthermore, all but two respondents felt that a research journal in mathematics education was a good idea. Most felt that NCTM was a reasonable organization to take on the task, although there was some skepticism on this point. The most prevalent suggestion from these reviewers was that a research journal needed to establish procedures to referee manuscripts in a scholarly manner. The concern was that since NCTM is not an organization of researchers, it might want its new a publication to serve other purposes (e.g., interpret research for teachers).

While the survey was being conducted, the chair of RAC prepared a draft proposal for the committee’s review. It was designed both to respond to a series of concerns that had been voiced by Board members and by members of the Publications Committee, and to formulate a structure for the creation of the journal. A number of concerns were voiced; these tended to center on four related issues:

1. Cost. Subscriptions to the journal by NCTM members needed to be voluntary. The typical teacher should not be expected to support the journal. Many doubted that sufficient subscriptions could be expected to make the effort financially viable. The fact that over 4,000 copies of the trial issue were sold alleviated some of these fears.

2. The Special Interest Group issue. Some skeptics were opposed to the idea of the organization sponsoring a publication oriented to the interests of a small group of persons, many of
whom were not even members of NCTM. Advocates of the journal responded that professional teachers would support research on the teaching and learning of mathematics with the long-term expectation that information derived from research would have an impact on their teaching—that is, the issues and questions of interest to the researchers are those of members of the profession. By sponsoring such a journal, we anticipated that some educational scholars in other fields (e.g., psychology, sociology) would focus their work with respect to mathematics, thus, contributing to our understandings.

3. Research in the Arithmetic Teacher and Mathematics Teacher. Several individuals were willing to support the initiation of a research journal with the dual anticipation that technical articles would no longer be published in the established journals, and that they would be replaced with interpretive articles for teachers. In fact, the suggestion was made that a research article should only be published when the author also submitted an interpretation of that work to the teachers’ journals. While this suggestion is unworkable for all research articles, the RAC agreed to encourage the preparation of reasonable interpretations of one’s work specifically for teachers.

4. Content and Organizational Structure. Scholarly refereed journals have a structure for the solicitation and review of articles with which many NCTM leaders were unfamiliar. Many wanted to suggest topics for solicited articles, others were skeptical of blind reviews, and others doubted that a sufficient number of good articles would ever be submitted.

After a review and revision of the proposal, bolstered by the survey results, the RAC submitted it to the Publications Committee which in turn recommended to the Board at its January 12-14, 1968 meeting that "the board authorize the publication of a Research Quarterly in Mathematics Education that will ultimately be self-supporting" (NCTM, 1968, p. 5). The Board moved to implement this recommendation on a three-year trial basis. After lengthy discussion, the vote of the members was
evenly split and the motion passed when President Donovan Johnson cast the deciding vote.

Following this decision, the RAC worked with the Publications Committee to bring to the Board plans for implementing its decision. At the April 15-18, 1968 Board meeting, the following action was taken:

Motion: It was moved, seconded and passed that the Board approve the following proposals of the Publications Committee concerning the publication of the MATHEMATICS EDUCATION RESEARCH JOURNAL:

Appointment of David C. Johnson as editor for a term of three years from April 1968 through April 1971.

The editor appointed by the Board of Directors is to have the privilege of selecting his own Editorial Board.

The date of the publication of the premier issue is to be March 1969.

The journal is to be published four times a year.

The size of each issue of the journal is to be from 32 to 48 pages. The page size is to be 6" x 9."

The subscription price is to be $5.00 per year. [Rescinded by later action.]

There is to be advertising in the journal.
The new journal is to be advertised in the Mathematics Teacher and the Arithmetic Teacher, and a special flyer is to be sent to institutions, to members of the Council, and to affiliated groups.

The Washington office is to be responsible for editorial work, printing, and mailing.

Comments: The anticipated individual circulation is 3,000. Four issues per year are needed to take advantage of special low-cost mailing rates. (NCTM, April, 1968, p. 10)

With the passage of this motion, the work of establishing a research journal passed into the hands of its editor and its editorial board. Details of the evolution of JRME are provided in a later section.

The Sample Publication of the Mathematics Education Research Journal

The RAC's goals for the sample issues of the research journal were:

1. To provide a rationale for both basic and applied research in mathematics education;

2. To exhibit significant research efforts;

3. To clarify the complementary nature of "information-oriented" (basic) and "product-oriented" (applied) research;

4. To demonstrate the potential impact of research and the implementation of research on
the teaching of mathematics, and

5. To sample the reactions of members of the profession to a research-oriented journal in mathematics education. (NCTM, 1967, pp. iii-iv).

Initially, ten manuscripts were selected. As explained in the Preface of the first issue, the Research Publication Committee "was well aware that no two persons, nor even two committees, would come up with the same set of manuscripts. The Research Publication Committee made its own selections, and it does not apologize for its choices. But it wants the reader to think of these papers as samples. In fact, it hopes the Council may want to sponsor further research publications and, perhaps, to create a journal for those of its members who have a special interest in research. (NCTM, 1967, p. iv).

The contents of this publication included the following manuscripts: The Case for Information-oriented (Basic) Research in Mathematics Education, by Patrick Suppes, Stanford University; The Acquisition of Knowledge, by Robert M. Gagné, University of California; Some Basic Processes Involved in Mathematics Learning, by Zoltan P. Dienes, University of Sherbrooke; Some Counting Models for First-Grade Performance Data on Simple Addition Facts, by Patrick Suppes and Guy Groen, Stanford University; A Comparison of Discovery and Expository Sequencing in Elementary Mathematics Instruction, by Blaine R. Worthen, University of Utah; Evaluation of Experiences in Mathematical Discovery, by Emil J. Berger, St. Paul Public Schools and Thomas A. Howitz, University of British Columbia; Individualized Instruction in Elementary Mathematics, by Joseph I. Lipson, University of Pittsburgh; Engineering Instructional Sequences for the Mathematics Classroom, by Bert Y. Kersh, Oregon State System of Higher Education; Teaching, Discovery, and the Problems of Transfer of Training in Mathematics, by Jerry P. Becker and Gordon K. McLeod,
Stanford University; Some Ongoing Research and Suggested Research Problems in Mathematics Education, by Boyd Holtan, University of Florida. The publication concluded with a summary, Research in Mathematics Education—An Overview and a Perspective, by the editor, Joseph M. Scandura, University of Pennsylvania.

The following comments have been excerpted from Scandura’s summary paper, which reflected the perspectives on research in the late 1960s. Particular attention in the articles was given to the nature of and the relationships between information-oriented (basic) and product-oriented (applied) research.

Let me begin by making a distinction between scientific research and developmental activity.

. . . Development refers primarily to those innovative classroom activities which have had so great an effect on mathematics education in recent years. The term "development," rather than "research," is used because most, although not all, of the resulting materials and procedures were obtained not by applying any existing theory or technology but simply on the basis of the perspicuious intuition or artistry of mathematicians who were also master teachers. Many of the innovators, themselves, are quick to point out that neither the scientific method nor scientific results were [consciously] used in any way.

This relatively informal and intuitive approach was sufficient in the immediate past because the gap between mathematics, as practiced by twentieth-century mathematicians, and mathematics, as it then existed in the schools, had become an abyss. Bridges had to be built, almost any kind of bridges. (1967, pp. 115-116)

Product-oriented studies were prevalent in the mid-1960s because
mathematics educators and others . . . [were] beginning to demand "hard facts" to support
the claims made by proponents of the various new programs. Evaluation was being
demanded, if for no other reason than to justify the funds spent on development. Originally,
the concern was with the question, "Does this new program (set of materials, etc.) work as
well as what we have been doing (using, etc.)?" Berger and Howitz have reported the results
of a comparative evaluation study designed to answer just this sort of question.

. . . .

Once having demonstrated that a new set of instructional materials . . . seems promising, . . .
the next step is to improve it. . . . During the course of such a development and evaluation
cycle, material developers . . . are often forced to reconsider their objectives and to translate
these objectives into a form that can be measured. The result [of such formative evaluations]
is almost always an improved product. (p. 116)

The articles by Kersh and Lipson provide two examples of formative product research:

Although both . . . make general use of the task analysis technology described by Gagné,
Kersh dealt with engineering instructional sequences for use in the classroom and Lipson with
the development of materials for use with individual students . . . [T]hese articles make it
clear that the purely artistic approach of the materials producer can be replaced by a clearly
specified technology, one which is subject to review, criticism, and . . . improvement.
(p. 117)

Scandura summarizes the concerns about "product-oriented" research as follows:
Nonetheless, the serious question remains as to whether present-day instructional technologies can improve on, or even equal, what the . . . mathematical artist has been able to accomplish.

One answer to such a challenge is that as technologies continue to improve, the improvements become available not only to the technology developers themselves, but to anyone else who wants to use them and who is willing to take the time to learn how. When the artist, on the other hand, improves his style with practice, the benefit is only to the artist himself and to those who have direct access to him as a teacher or to his products (e.g., texts, etc.).

. . . .

The case for product-oriented research is quite direct. Whenever research (e.g., evaluation) demonstrates the value of one product over another or that a product meets certain standards, or, whenever a technology makes it possible to produce more and better materials in an efficient manner, both the practitioner and the student benefit rather directly. (p. 118)

The article by Suppes made a case for an active program of basic research in mathematics education. Scandura summarized his position by stating its key points:

(1) intuition alone provides an insufficient base for devising new curricula (or instructional procedures)—intuitive judgments and objective facts are too often at opposite ends of the pole,

(2) the number of sheerly empirical studies is certainly large in number, if not uncountable—achieving order out of chaos will depend on the development of a sound theory of mathematics learning, based on carefully thought out information-oriented studies, (3) there is a need to analyze and provide a theory for students' learning difficulties, and (4) a better understanding of how mathematics is learned and how mathematicians think may lead to a revised conception of the nature of mathematics itself—in particular, a more central emphasis
may be given to the patterns of thought found useful in dealing with mathematics. (pp. 118-119).

Then, to summarize the four articles reporting information-oriented research, Scandura added the following:

The time-honored purpose of basic research is theory development. To be classified as basic, the research must deal with (1) the identification of and relationships between (2) well-defined variables which are (3) theoretically relevant.

The article by Worthen serves as an example of basic experimental research which also has rather direct practical implications. . . . The discovery group not only performed better than the expository group on tests designed to measure the transfer of heuristics but they better retained the material that had been originally taught. (p. 119)

The . . . relationship Dienes found between learning strategy and the way a mathematical task is perceived by a learner illustrates the utility of [the correlational] approach, which involves uncovering relationships between variables.

The studies reported by Suppes and Groen and Gagné well exemplify a third approach . . . [which] involves setting up a single well-defined situation, determining the outcomes in an objective fashion and then comparing the obtained outcomes with predictions made on the basis of one or more theories. . . . [T]he differences exemplified by these two studies have deep roots and, in fact, are suggestive of two critically important, but fundamentally different,
aspects of mathematical learning and performance. Gagné was largely concerned with determining prerequisites for successful performance. . . . while Suppes and Groen, implicitly assuming a common level of prior knowledge, sought to determine what knowledge would be used. The relative power of each approach depends on what kinds of predictions one wants to make. (pp. 120-121)

Still a fourth approach to information-oriented research involves the careful and often painstaking naturalistic observation. On the basis of intuition and detailed observations of how young children learn mathematics, Dienes has identified those kinds of activity which he feels are fundamental to all mathematics learning. He has singled out for special emphasis play, informal exploratory behavior; abstraction, the identification of that which is common to a number of situations; generalization, the extension of an abstract class to a broader class; particularization, the passage from a broader class to one more restrictive; symbolization, the symbolic representation of mathematical ideas; and interpretation, the determination of meanings underlying symbols.

. . . .

[Finally], review articles, such as that by Becker and McLeod, also play a vital role in information-oriented research. This is particularly true when the authors provide a rationale both for classifying existing research and for placing proposed research into a perspective. (p. 122)

Scandura then concludes his article with the following:
To avoid needless dispute, let me emphasize that it is often difficult to distinguish between information-oriented research and product-oriented research, let alone between information-oriented research which is explicitly theory-oriented and information-oriented research which is not. Furthermore, even developmental activity frequently provides valuable information (or at least raises important theoretical questions) while the results of information-oriented research may find rather direct application. The many-faceted nature of much research is well exemplified by the Kersh and Worthen articles and by several of the listings of ongoing and needed research which were solicited and compiled by Holtan. Perhaps the ultimate basis for categorizing a study is the researcher’s motivation to find out why or to improve an existing situation.

The major purpose of this article has not been to favor information-oriented or product-oriented research over artistic development but simply to help clarify some of the interrelationships between them. It has been suggested, however, that if mathematics education is to improve fundamentally beyond its present state more will be required than simply teaching more mathematics at an earlier age. We, as mathematics educators, will have to turn our attention more and more toward the development of improved technologies for preparing materials and for instructing students. Such advanced technologies, in turn, may, be expected to depend increasingly on a more complete understanding of how mathematical knowledge is organized, learned, taught, measured, and created.

Information-oriented research, product-oriented research, and development are all necessary. Information-oriented research, without related product development, is of
no use to mankind while product-oriented research and development, without
supporting basic research, may too easily become tradition-bound—or, what is equally
bad, revolution-bound." (pp. 124-125).

In summary, the goal of producing a quality example of a research journal that would address
practical and theoretical issues related to the teaching and learning of mathematics had been met. The
response to the sample issue was very positive and its existence strongly contributed to the NCTM
Board’s decision to publish JRME.

The Initial Structure, Policy, and Procedures for JRME

The Board vote to publish the journal was a vote in principle; it was not a vote based on any
substantial documentation of policy and procedures, nor did it include a budget. However, this
approach did enable the President to appoint an Editor, who was charged with responsibility for
setting up the mechanisms—structure, policies, procedures, and budget—for producing the periodical.

The official announcement that David Johnson would serve as Editor was made in the NCTM
Newsletter of May 1969, in which the new NCTM President, Julius Hlavaty, also announced the
NCTM Golden Jubilee Year—fifty years of service to mathematics education.

As Editor, David C. Johnson is preparing for the advent of the NCTM’s newest journal. He
is keenly aware that the revolution in school mathematics has been accompanied by increased
activity in mathematics education research, which should be widely reported and evaluated.
In an effort to provide an effective means of communicating the results of research activities
to the education community, the NCTM will introduce a new quarterly this winter. The
"Journal for Research in Mathematics Education" will be concerned primarily with research in three categories: (1) empirical studies in mathematics education, (2) heuristic approaches to research in mathematics education, and (3) summaries or critiques of major research studies in mathematics education. Other types of research may be included if they have implications for school mathematics. [NCTM, 1969, Vol. 4, No. 4, p. 4]

The period from late 1968 through the calendar year 1969 was spent setting up the Journal—establishing structure, policy, and procedures (and preparing for publication). Initial tasks were to provide more complete documentation for the NCTM Board of Directors (including acceptance of a title for the Journal), to establish the management structure (Editorial Board), to select (send invitations to) referees, and to formalize links within the Council. The name of the Journal, proposed by the Editorial Board and accepted by the Board of Directors, was the Journal for Research in Mathematics Education (JRME); it was to consist of 64 pages and be published quarterly.

The management structure proposed, and accepted, was to have a "working" Editorial Board consisting of the Editor, Associate Editor, Consulting Editor, and "Other Board Members." This group consisted of David Johnson, Tom Romberg, Ralph Tyler, Joe Crosswhite, Robert Pingry, Patrick Suppes, Fred Weaver, and James Wilson. And, as was the case with the other NCTM journals, the Editorial Board (Editor) was to report to the Council through the NCTM Publications Committee. Direct links to NCTM headquarters were to be through Charles Hucka (production) and Thomas Slaughter (advertising and circulation). The Editor was also charged with responsibility for maintaining regular contact with the Editors of the Arithmetic Teacher and Mathematics Teacher.

A crucial element in the early negotiations with the Council was the establishment of an operating
budget (excluding production and mailing, which were in-house operating expenditures and intended eventually to be covered by subscriptions). The Editor’s budgets (including two meetings of the Editorial Board and Editor’s travel to annual meetings of the NCTM and AERA and attendance at two meetings of the Publications Committee) for the periods June—May, 1970-71, 1971-2, 1972-3, and 1973-4, were $8,300, $6,350, $7,000, and $9,900 respectively (with secretarial support in the amount of $2,000 annually in the same periods, except for the transition to a new Editor in the last year).

As individuals learned of the immanence of the new journal, they submitted manuscripts, even without author guidelines (which were available upon request and were officially published in JRME, Vol. 1, No. 1, January, 1970). About 90 manuscripts were submitted prior to January, 1970 (many early in 1969), very few of which conformed to style requirements. These papers all needed to be processed. Because the first issue of the Journal was scheduled for January 1970 and the second in March, with lead times of at least three months, considerable editing of a subset of the papers to fit the requirements was needed. About 60 papers were rejected; the remaining 30 were considered to have potential for publication. These required revision or reframing, and further review. Initially, eight papers were judged as acceptable pending revision by the Editor. It was also the Editor’s responsibility to communicate detailed summary comments on what needed to be done for "potential" manuscripts. This was often "speeded up" by actually returning to an author an edited and re-typed copy of his/her manuscript. This procedure was modified later to that of sending referees’ comments directly to authors, with the Editor primarily calling attention to particular key points or issues.

To handle the initial processing of manuscripts at the same time that staff was establishing the system was a non-trivial task, since the stages also included sending galley proofs to authors, collating their
comments with the Editor’s proofreading, returning these to Washington, and then proofreading page proofs before final production.

The policy established by the Editorial Board and approved by the Council is reflected in the Call for Papers, published in January, 1970. Key policy points are noted in regard to the need

a) for better communication of "research results to the mathematics education community";

b) to provide more systematic and comprehensive reporting of research results; and

c) to publish research articles dealing with significant problems in mathematics education. (1970, pp. 61-62).

The Call for Papers also included an extended description of "empirical studies." Noted as examples were "controlled experiments, surveys, status studies, correlational studies, learning studies, or case studies," with the hope that such would encourage a wide range of types of research. In addition, the term, "articles about research" was described as "theories or models for mathematics education which lead to questions that can be researched, review of literature in an area—including the raising of questions for further study, research methodology—when [a] manuscript has definite implications for research in mathematics education." (pp. 61-62).

Policy was expanded upon further in the Editorial Board’s guideline, Information for Contributors, (prepared by Tom Romberg) published in May, 1970 (Vol. 1, No. 3, pp. 187-192). This paper also dealt with procedures and the presentation of papers, submitted within what was intended to be a broad mandate. This paper included sections that elaborated on distinctions among "articles about
research in mathematics education," "summary and critiques of major research studies in mathematics education," "critiques of articles," and "a forum for researchers." The critique and forum papers represented what the Editorial Board felt were important components in the promotion of debate and the identification of issues.

The call for forum papers reflected the commitment of the Editorial Board to the "continual appraisal of the nature, scope, and function of research as it applies to the learning of mathematics" and "accordingly, those who are concerned about the character of research in the field are invited to submit brief analyses, critiques, or proposals about the nature of research in mathematics education."

These were to be "position papers." Two such papers were published during Johnson's term as Editor. The first of these appeared in November, 1979 (Vol. 1, No. 4, pp. 251-255)—a paper by Lewis Aiken, which focused on affective factors in mathematics learning. The second, May 1971 (Vol. 2, No. 3, pp. 228-234), was by Thomas Kieren on manipulative activity in mathematics learning. Both papers served to illustrate what was intended and expected for inclusion in this "department" in the Journal.

The March 1971 issue (Vol. 2, No. 2) was a Special Issue, with guest editors James Wilson and Gilbert Peaker (and length was expanded to 112 pages). Eleven of the papers in this issue were critiques of the International Association for the Evaluation of Educational Achievement (IEA) Mathematics Study and, as such, were to illustrate aspects in the category of "summary and critiques of major research studies."

Readers were also encouraged to prepare a "critique of an article recently published in the Journal (or other research journal) . . . critiques of a general nature (not limited to a single article) will also be
considered." Further, it was policy for the Editor to send a copy to the author of the original paper with an invitation to respond. The intent was "to help open up meaningful discourse on professional matters through Critiques." A number of such papers were published in the first four volumes of JRME: May 1971 (Vol. 2, No. 3), critique by Romberg and Montgomery (pp. 235-237) and reply by Fletcher (pp. 238-240); May 1972 (Vol. 3, No. 3), critique by Holz (pp. 183-185) and reply by Moody and Bausell (pp. 186-188); March 1973 (Vol. 4, No. 2), a critique by Bright (pp. 126-128); and May 1973 (Vol. 4, No. 3), a critique by Kulm (pp. 187-189) and reply by Keats (pp. 190-192).

Forum papers were of the order of seven to ten pages, or 3,000 to 4,000 words, and critiques were in the order of 1,500 words. The Call for Papers (and Information for Contributors) (1970) indicated that "the average manuscript should be about 12 pages" (about 5,000-6,000 words). This was deemed to be consistent with the policy that the Journal provide a mechanism for disseminating reasonably "full" accounts of research activity—i.e., background literature (theoretical perspective), detailed presentation of the research design and data analysis, and discussion. The initial policy, which was to provide examples of a wide range of methodologies and topics, was revised in late 1970. To get away from attacking problems in a piecemeal fashion, the Editorial Board invited researchers to submit papers representing a coordinated approach to research on a major problem. The indication is that "such blocks of research" could be published in a regular or special issue of JRME, or as an NCTM research monograph. Two such collections were published, in March and November 1973 (Vol. 4, No. 2, and Vol. 4, No. 4). The first of these, Toward a Theory of Sequencing: An Integrated Program of Research (pp. 85-125), was based on a program of research at Pennsylvania State University and included a paper by Heimer and Lottes discussing the theoretical framework (pp. 85-93), followed by eight linked research reports. The second, Educational Research in Mathematics at The University of Wisconsin Research and Development Center for Cognitive
Learning with an overview and framework paper by Harvey and Romberg (pp. 243-250), followed with three illustrative supporting research reports (pp. 251-278).

In 1971 it was decided that JRME would publish the annual ERIC annotated listings, Research on Mathematics Education (K-12). These, prepared by Suydam and Weaver, were included in the November issue of each of Volumes 2, 3, and 4. In order to include them, along with a planned continued output of articles, the Journal was expanded to 96 pages for each such issue.

Four of the Board's concerns about publishing a research journal need to be reiterated at this juncture. First, it was projected that at least 3,000 subscriptions would be needed to make the journal self-sufficient. This target was surpassed by the end of the initial year of publication: in January, 1971, 3,640 paid subscriptions were in force; subscriptions were to increase to 4,707 by January 1972, and to 5,078 by January 1973. Second, some felt few good manuscripts would be submitted. This never proved to be a problem. However, it took some time before the backlog of accepted papers reached a level that required an increase in the number of pages. Third, there was uneasiness about the editorial review process and the challenge of meeting the requirements of research journal style. But since all papers initially were reviewed by at least two members of the Editorial Board, which also looked at the general pattern of articles being submitted (titles) and status (rejection, returned for revision, returned for revision and further review, or accept), this also proved of little concern.

The Information for Contributors in the May 1970 issue included a section on "Agreements and Expectations of the Editors" (pp. 188-189). The responsibilities of authors (e.g., "papers should not be under consideration for publication by other journals, nor should thy have been published previously by other journals"), as well as those of the Editor and staff of JRME, were articulated.
Here was noted the *Journal's* commitment to "inform the author of the editorial decision within 8 to 12 weeks after . . . the manuscript has been submitted," in a form which met the style requirements. The Editor was also charged with informing an author, at the time a paper was accepted, when it was likely to be published. The Editorial Board determined that the style requirements would be those of the American Psychological Association.

Finally, there was concern about interpreting research findings for teachers. A number of recent initiatives reflect the Council's dissemination efforts. Interpretive articles now appear regularly in *Arithmetic Teacher* and *Mathematics Teacher*, and three excellent summaries of "research ideas for the classroom" (early childhood mathematics, middle grades mathematics, and high school mathematics produced by NCTM's Mathematics Research Interpretation Project) make substantial use of the results from papers published in *JRME* (Jensen, 1993; Owens, 1993; and Wilson, 1993).

In retrospect, in the first four volumes of *JRME* we achieved both breadth and depth in our coverage of research topics and issues, even in the limited space provided by quarterly publication.

**Conclusions**

There are three aspects of the origins of *JRME* that we hope readers of this article recognize and appreciate. First, the growing community of researchers studying the teaching and learning of mathematics needed a journal in which they could share their ideas and the results of their work. Second, the idea that NCTM should sponsor the publication of such a journal was controversial: The concerns voiced by many members of the Council were real. And, finally, the steps taken by the Board, which appear in retrospect to be cautious, were realistic: (1) to form a Research Advisory Committee, (2) to publish a sample issue of the projected journal, and (3) to agree to a new structure
and format for the projected NCTM journal, based on what we learned in publishing the initial or sample issue.

In closing, it is interesting to note that current NCTM policy includes a "position statement" specific to research, the opening sentence and last paragraph of which state:

Significant improvements in the teaching and learning of mathematics result from the systematic development of research-based knowledge.

... The National Council of Teachers of Mathematics (NCTM) affirms the central role of research in the teaching and learning of mathematics. NCTM therefore supports research in mathematics education and promotes efforts to communicate the findings and implications of such research. Furthermore, NCTM encourages all mathematics educators to be involved in activities related to research.

(NCTM, September 1990)

NCTM has come a long way in the past quarter century.
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