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Basic Versus Applied Research: Intrinsic and Extrinsic Considerations

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One issue affecting the development of the scientific base of nursing is whether the priority for nursing should be basic or applied research. Re-examination of this issue merits more attention due to the current financial retrenchment affecting the funding of nursing research. This article analyzes the arguments for basic and applied research and examines the problems surrounding this issue.

Establishment of a scientific base requires research and theory development. Research and theory building are complimentary activities responsible for creating a scientific base. Inherent in the establishment of a scientific discipline is the need for nurse scientists to consider the role of both basic and applied research in its development. Research is "systematic, intensive study directed toward fuller scientific knowledge or understanding of the subject studied" (Schultz 1979). This definition of research is akin to the goal of any scientific field: "to accurately describe phenomena, to explain and compare different orders of phenomena and to ultimately predict and control phenomena under investigation" (Leininger 1968). As nursing moves from a practice-oriented base to a scientific one, this issue (basic versus applied research) increases in significance. Both basic and applied research affect the scientific base of nursing. However, they impact differently on that science.

BACKGROUND

In 1968, a conference on the Nature of Science and Nursing was held at the University of Colorado. At this conference, basic and applied research were presented and discussed. The discussion attempted to delineate the two types of research and their implications for nursing science. This issue was especially important, since the emphasis at that time was on applied research. Leininger (1968) pointed out that since World War II, increasing financial financial support was being given to applied research to advance industrialization, which increas-

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ingly valued materialism and technology. The consensus as the conference declared that a developing science needs both basic and applied research. Since no immediate barriers to the pursuit of basic or applied research were identified, preference for either type of research was not a salient issue.

Ever increasing funding for applied research stimulated proponents of basic research to reiterate the need for basic research. From the field of education, Kerlinger (1977) argued for basic research. His rationale was that basic research has a greater effect on long-term outcomes. A recurrent theme, common to the 1968 conference and to Kerlinger is that of economics. In contrast to the increased funding for research in the 60s and 70s, the emphasis today is on decreasing funding.

Basic Research: Intrinsic Considerations

Basic research is defined here as the pursuit of *new* knowledge through the process of scientific inquiry without regard to its use. The aim of basic research is to expand the scientific base of a field of knowledge and to lead to further research. Terms used synonymously with basic research are scientific research and pure research. Several arguments can be advanced to support the priority of basic research over applied research. Kerlinger (1977) states that basic research has a greater effect than applied. He substantiates his argument by pointing to a study conducted by Comroe and Dripps (1976) that found basic research "pays off in terms of key discoveries almost twice as handsomely as other types of research and development combined." Given this fact, support for basic research should receive greater emphasis.

Implicit within the definition and aim of scientific research is its purpose: to build theory. Abdellah and Levine (1979) present theory building as a reason for conducting basic research. In their typology of research they state that pure research is necessary:

> to establish fundamental theories, facts, and/or statements of relationship among facts in some area of knowledge that are not intended for immediate use in some real life situation. (p. 445)

Others, such as Kerlinger (1977) and Braithwaite (1953), also support this view. Through the generation of theory, scientific knowledge will be advanced so that emphasis is placed on understanding and explaining phenomena. Basic research is a tool nurse scientists use to generate theory and to build constructs.

Generalizability of basic research is another reason to advocate its priority. The ability to generalize the findings of pure research arises from the abstract nature of the investigation (Crawford, Dufault, and Rudy 1979). Because of the lack of specificity, findings become the impetus to conduct further research. Findings are not bound by a particular situation or circumstance. This abstractness gives the freedom to use basic research findings in various settings. As a result, basic research usually precedes or is the basis for subsequent applied research.

Pure research is also more value-free and less prone to time pressures from funding agencies (Folta 1968; Kerlinger 1977; and Crawford, Dufault, and Rudy 1979). Value-free means that the problem being researched usually is not defined or identified by the funding source. Basic research also is less likely to succumb to time pressures. Agencies supporting the research do not pressure the investigator(s) to release preliminary data. Because findings are not immediately applicable, basic researchers are more insulated from value and time pressures.

Disadvantages of basic research result from the strengths listed above. Pure research does not solve immediate problems (Crowley 1968). Application of the findings may take years and changes may not occur in the practice setting. The future orientation of basic research affects long-range not short-range goals.

In addition, basic research is not useful in decision-making. This knowledge is more general and is of limited useful policy-makers and practitioners (Abdellah and Levine 1979). To solve a problem or to make a decision is not an attribute of basic research.

A pure research strategy may be rejected when seeking to develop or evaluate a program. This is because basic research is not outcome oriented. Findings of basic research are not tailored to a preplanned purpose. The path of basic research is more likely than not to be serendipitous (Causey 1969). Specific targeted outcomes cannot be anticipated, consequently, basic research is not commonly used to solve problems or to make decisions.

Applied Research: Intrinsic Considerations

Applied research is the type of design investigators usually adopt to solve problems or to make decisions. Applied research can be defined as the pursuit of knowledge through the process of scientific inquiry or the application of fundamental knowledge and laws and is specifically directed toward some defined purpose or outcome. The reason for doing applied research is "to obtain new facts and/or identify relationships among facts which are intended to be used in a real-life situation (Abdellah and Levine 1979). Applied research is practical and utilitarian, and can be used to develop or evaluate a program, procedure, process, or product (Abdellah and Levine 1979).

Applied research is especially useful in nursing, which provides a service to clients. Most nurses work in situations that give rise to practical, researchable problems. For example, does it make a difference if diabetic urines are checked using a single or a double-voided specimen? Such a study evaluates the necessity of obtaining a double-voided urine specimen, and the results are directly applicable to the practice setting. As Abdellah and Levine note, applied research is adopted in situations requiring immediate answers or solutions. Outcomes of applied research can lead to change in the practice settings.

Nurses provide a service that deals with human problems which require practical approaches. As a service oriented profession, nursing must be responsible to public needs. Folta (1968) argues that researchers must "assume responsibility for the utilization of such findings (scientific findings)." It is no longer acceptable for researchers to conduct basic research that cannot be used. Increased public funding has required that researchers be accountable. The expectations of a highly industrialized society are that research will solve problems or product outcomes (Leininger 1968). Emphasis on results requires that nursing be cognizant of the responsibility that the profession has to society. Fulfillment of this responsibility to the public will best occur via applied research.

Nursing is developing a body of science and its theories are in the process of being developed and tested. Through applied research theories will be tested. The practice setting provides nurse theorists with the "reality to theorize about or impose order on" (Jacobs and Huether 1978). Applied research contributes to theory in that it validates nursing theory(ies) in the practice setting. Clinical testing is an important step in theory building. Unless theories have been tested, they cannot serve to direct practicing nurses.

Some disadvantages are associated with applied research. Since applied research can be targeted at specific problems, the results are not as generalizable. Findings are applicable to a particular setting under certain conditions. This characteristic makes applied research useful for the short-term but does not generate basic scientific knowledge necessary to the long-term goal of building a scientific base. If too much attention is given to applied research, science runs the risk of operating under a false economy. As pointed out by Kerlinger, basic research, not applied, is more productive in the long term. Applied research is not the most appropriate strategy to accomplish long-term gains.

While applied research can be used to test theory, it is not necessarily the best strategy to generate theory. The parameters defined in an applied research study are exacting, and this lack of generalizability may be an impediment to theory generation. Using applied research to develop a theory is somewhat comparable to the research-then-theory approach outlined by Reynolds (1971). To find an interesting pattern in the resulting data giving rise to theory is not likely. More data must be collected to discern patterns leading to theory development. Because applied research studies are narrow in focus they do not supply enough data to generate theory.

Extrinsic Considerations: Funding

Although the American Nurses Foundation and other private sources fund research, the federal government is the largest supporter of nursing research. Federal funding for nursing research has grown from $500,000 in 1955, to $5 million in 1981 (Oakley 1981). Funding for nursing research is not likely to increase under the current administration, and continued funding at the present level may remain only through rigorous lobbying efforts.

Research monies from the federal government are facing an uncertain future. Nurse researchers must choose the most fruitful projects so that short- and long-term goals are achieved. The projected decrease in federal spending means that researchers must begin to explore previously untapped sources of funding. Rimm (1981) lists some intramural and extramural sources of funding. For example, clinical agencies and universities are intramural, while Sigma Theta Tau and the American Heart Association are extramural. Emphasis has been and continues to be on applied, not basic, research. The question arises, will there be continued funding for studies affecting nursing science and nursing practice with limited financial resources.

EDUCATION

Nursing research demands adequately prepared investigators. In 1968, Conant wrote on the problems surrounding nurse researchers. She briefly examined the preparation of those who were conducting studies in nursing. At that time, most nurse researchers had received preparation in other fields, such as sociology. Conant pointed out that preparation of nurse researchers in another field could lead to deficiencies. Later, Dorothy Johnson (1978) advocated that nurse researchers ask "questions that differ substantially from the orientation of other disciplines." Gortner (1980) commented on the size and quality of the investigator pool, stating that "the current state is one of continued insufficiency, although the situation is brighter and much improved from a decade earlier." The National League for Nursing includes certain aspects of research in the characteristics of baccalaureate and master's degree programs (NLN

1979a, b). However, primary responsibility for conducting basic and applied research belongs with doctorally prepared nurse researchers. Those who have doctorates in nursing are charged with furthering the scientific base of nursing. Despite the opening of doctoral programs there remains a dearth of adequately prepared nurse researchers.

COMMUNICATION

Communication of findings to practicing nurses is another factor in nursing research. Barnard (1980) presents three problems surrounding this issue:

> First, few studies have findings that can be the valid basis for practice. . .[because] the real world seldom matches the study design. . . .A second problem with dissemination is the time required for new findings to reach the practitioner. . . .[and] The third challenge is to learn how to use the abundance of available information to make rational decisions. (p. 211)

To close the abyss associated with research and practice, nursing must exert energy to bridge the gap. Since practicing nurses are more likely to see the benefits of applied research rather than basic research, dissemination of findings is required. Research reports should be communicated clearly to nurses, which may require the deletion of highly sophisticated research jargon (Barnard 1980). Another suggestion is the development of a national center for nursing research. This center could be modeled after the National Clearinghouse for Drug Information. A national center for nursing research could collect basic and applied research reports, findings, and bibliographies to be accessed by computer for the benefit of nurse researchers, practitioners, and educators. This would help assure the incorporation of findings into practice and generate further research. Communication to fellow researcher and practitioners is important. Reviewing the problems associated with dissemination of findings and offering suggestions for improvement are made because research findings must be communicated to be used.

FUTURE DIRECTIONS

The future of any science rests on its research base. To propel nursing forward as a science requires continuing research. The effect of economic and human resources on nursing research will affect the development of a scientific base for nursing. Thus, whether to conduct basic or applied research cannot be resolved without considering economic and human resources as well as communication of findings.

The difference between basic and applied research is not always clear. To distinguish between basic and applied research requires an examination of the study purpose. If a study intends to seek new knowledge, categorize it as basic; if a study is directed toward solving a problem, making a decision and developing or evaluating a program, classify it as applied research. Basic research generates theory, builds constructs, and focuses on long-term, generalizable results. Basic research has the advantage of being more value-free and not as susceptible to time pressures from funding agencies.

Applied research can be used to solve problems and make decisions that require immediate solutions. This strategy works well for researching short-term goals. Applied research is a way of testing theories. Compared to basic research,

applied research is not as apt to generate theory. Applied research is particularly useful in the clinical setting when dealing with practical problems.

How well will nurse scientists carry out research in the future? This question is critical, due to decreased financial resources. Research required adequate funding, appropriately prepared researchers, and dissemination of fundings. Just as Lindeman (1975) conducted a survey using the Delphi technique, which asked nursing leaders to rank priorities in research directly concerned with patient welfare, perhaps it may be time to develop a new research agenda ranking priorities inclusive of both basic and applied research. This is an essential consideration if nursing science is to be launched into the mainstream as a scientific discipline. Even more important to the planning of nursing research is the need for investigators to become politically astute. Oakley (1981) outlines the legislative process and suggests strategies nurses can implement to insure continued funding for research.

CONCLUSION

Basic and applied research are complimentary strategies that often overlap. Nursing needs basic research to discover new knowledge, and applied research to make use of the new knowledge. Basic research is a necessity because nursing aspires to be a scientific discipline. Likewise, applied research is a necessity because nursing provides a service.

The most salient issue regarding nursing research is not whether the priority for nursing should be basic or applied research. This view is held by leaders in nursing such as Folta (1968), Downs and Fleming (1979), and Abdellah and Levine (1979). Rather, the most pressing problem affecting nursing research is whether it will be conducted. No doubt nursing research will continue, but the types of studies may be biased. Limited financial resources may eliminate studies that require more time and have no guarantee outcome, i.e., basic research. Nursing leaders must insure that a balance between basic and applied research continues despite limitations in financial and human resources. Developing a research agenda gives direction to researchers. Just as importantly, research agendas must be evaluated, updated, and changed to continue to meet the needs of an evolving science. Periodic re-evaluations of the research agendas will consider requirements for basic and applied research in a climate not isolated from political, economic, and human realities.

The future of nursing science and practice is dependent on both basic and applied research. Financial resources, preparation of nurse researchers, and communication of findings are relevant to the future of nursing research. These problems have provided a framework that make re-examination of the basic question timely and appropriate. Nurse researchers should continue to conduct both basic and applied research. However, nursing must assure that both types of research will be conducted by: 1) being cognizant of current economic impacts on the furure of nursing research, 2) becoming politically active to effect increased funding for nursing research, 3) taking appropriate safeguards to prevent emphasis on only applied or basic research, 4) knowing the limitations of available human resources and 5) continuing to find new ways to effectively communicate findings.

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