

The strengths and weaknesses of quantitative and qualitative research: what method for nursing?

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The overall purpose of research for any profession is to discover the truth of the discipline. This paper examines the controversy over the methods by which truth is obtained, by examining the differences and similarities between quantitative and qualitative research. The historically negative bias against qualitative research is discussed, as well as the strengths and weaknesses of both approaches, with issues highlighted by reference to nursing research. Consideration is given to issues of sampling, the relationship between the researcher and subject, methodologies and collated data, validity, reliability, and ethical dilemmas. The author identifies that neither approach is superior to the other, qualitative research appears invaluable for the exploration of subjective experiences of patients and nurses, and quantitative methods facilitate the discovery of quantifiable information. Combining the strengths of both approaches in triangulation, if time and money permit, is also proposed as a valuable means of discovering the truth about nursing. It is argued that if nursing scholars limit themselves to one method of enquiry, restrictions will be placed on the development of nursing knowledge.

DEFINING QUANTITATIVE AND QUALITATIVE RESEARCH

Quantitative research is also described by the terms 'empiricism' (Leach 1990) and 'positivism' (Duffy 1985). It derives from the scientific method used in the physical sciences (Cormack 1991). This research approach is an objective, formal, systematic process in which numerical data are used to quantify or measure phenomena and produce findings. It describes, tests and examines cause and effect relationships (Burns & Grove 1987), using a deductive process of knowledge attainment (Duffy 1985).

Whereas quantitative methodologies test theory deductively from existing knowledge, through developing hypothesized relationships and proposed outcomes for study, qualitative researchers are guided by certain ideas, perspectives or hunches regarding the subject to be investi-

gated (Cormack 1991). Qualitative research also differs from quantitative approaches as it develops theory inductively. There is no explicit intention to count or quantify the findings, which are instead described in the language employed during the research process (Leach 1990). A qualitative approach is used as a vehicle for studying the empirical world from the perspective of the subject, not the researcher (Duffy 1987). Benoliel (1985), expands on this aspect and describes qualitative research as 'Modes of systematic enquiry concerned with understanding human beings and the nature of their transactions with themselves and with their surroundings'.

The aim of qualitative research is to describe certain aspects of a phenomenon, with a view to explaining the subject of study (Cormack 1991). The methodology itself is also described as phenomenology (Duffy 1985), or as a humanistic and idealistic approach (Leach 1990), with its

origins lying in the disciplines of history, philosophy, anthropology, sociology and psychology (Cormack 1991) This historical foundation, which is not that of the physical science domain, has been cited as one of the great weaknesses of qualitative research, and is associated with the poor initial uptake of the approach within nursing (Bockmon & Rieman 1987)

HISTORICAL BIAS

Historically the use of true experiments has contributed greatly to the universal knowledge now acquired, especially in the field of medicine The quantitative methods used produced legitimate scientific answers, and as a result of this 'hard' data, action was generated and changes took place (Melia 1982) The qualitative approaches produced 'soft' data which were, and are still described by some, as being inadequate in providing answers and generating any changes One can argue that the use of the labels 'hard' and 'soft' data suggests in itself that analysis by numbers is of a superior quality to analysis by words (Corner 1991)

Benoiel (1985) considers the role nursing literature has played in giving qualitative research a lower status The message, only 9 years ago, was that qualitative research is primarily for the discovery of knowledge to be tested, and was subsidiary to quantitative research Bockmon & Rieman (1987) discussed the difficulties qualitative researchers had before the mid-1980s in achieving publication traditional nursing journals Historically, funding for research was awarded mainly to quantitative research reports (Duffy 1986), emphasizing the depth of acceptance and respect for this particular method

Qualitative research thus has had a major obstacle to overcome in achieving recognition for its contribution to knowledge Evaluation of qualitative research has been inhibited through lack of published papers It is because of the recent increase in nursing publications using the qualitative methodology, that an analysis of the strengths and weaknesses of both quantitative and qualitative approaches can be conducted

SAMPLING

Sampling procedures for each methodology are complex and must meet the criteria of the data collection strategy Both research approaches require a sample to be identified which is representative of a larger population of people or objects Quantitative research demands random selection of the sample from the study population and the random assignment of the sample to the various study groups (Duffy 1985) Statistical sampling relies on the study sample to develop general laws which can be generalized to the larger population The advantage of results obtained from random sampling is that the findings have an

increased likelihood of being generalizable The disadvantage, and a weakness of the quantitative approach, is that random selection is time-consuming, with the result that many studies use more easily obtained opportunistic samples (Duffy 1985) This inhibits the possibilities of generalization, especially if the sample is too small This is demonstrated in the study by Gould (1985) who investigated nurses' knowledge of isolation procedures within a specific health district The study makes interesting comments, but it is not possible to generalize from its findings as the sample is too small

Qualitative research, because of the in-depth nature of studies and the analysis of the data required, usually relates to a small, selective sample (Cormack 1991) A weakness of this can be the suspicion that the researcher could have been influenced by a particular predisposition, affecting the generalizability of the small scale study (Bryman 1988) This suggests that qualitative research has a low population validity However, the strength of this approach is seen when the sample is well defined, for then it can be generalized to a population at large (Hinton 1987) Raguucci's (1972) ethnographic nursing study demonstrated the value of this approach in studying the benefits and practices of minority ethnic groups

RELATIONSHIP BETWEEN RESEARCHER AND SUBJECT

Relationship in quantitative research

In quantitative research the investigator maintain a detached, objective view in order to understand the facts (Duffy 1986) The use of some methods may require no direct contact with subjects at all, as in postal questionnaire surveys It can be argued that even interview surveys require the researcher to have little, if any contact with respondents, especially if hired staff carry out most of all the interviews (Bryman 1988) The strength of such a detached approach is avoidance of researcher involvement, guarding against biasing the study and ensuring objectivity

Such an approach was successfully used in the West Berkshire-based perineal management trials of Sleep *et al* (1984) This midwifery study was indirectly controlled by the researchers whose main involvement, other than randomly allocating mothers to either the controlled or experimental episiotomy group, was to analyse the data, once collected The findings of this study, through its objectivity, have contributed to knowledge within this field

Spencer (1983) argues that little is derived from such an indirect researcher-subject relationship especially in the health care setting His major criticism is that the detached approach treats the participants as though they are objects and, as such, places hospitals on par with car repair garages Cormack (1991) also emphasizes the weaknesses of

such an approach. She argues that the research participants are usually kept in the dark about the study, and are often left untouched by the research itself but are expected to transfer the findings into practice. These arguments are examples of the criticism that quantitative methods treat people merely as a source of data.

Researcher-subject relationship in qualitative research

As with quantitative research, qualitative methodologies also have supposed strengths and weaknesses regarding the closeness of the relationship between researcher and respondent. Duffy (1986) argues that a strength of such an interactive relationship is that the researcher obtains first-hand experience providing valuable meaningful data. As the researcher and the subject spend more time together the data are more likely to be honest and valid (Bryman 1988).

Supporting this argument is the study by Baruch (1981) which revealed that time and the subsequent relationship built between the researcher and the subjects was crucial for a genuine understanding of the dilemma faced by parents of sick or handicapped children. This appears to be a major strength of the qualitative approach itself, as Woodhouse & Livingwood (1991) pointed out in their study of a multi-agency substance abuse project. They claimed that the approach, because of the interactive method, far exceeded expected evaluation outcomes, by contributing to empowerment, and enhanced communication and clarification of roles among the partners involved in the project.

The weakness of such a close relationship is the likelihood that it may become pseudotherapeutic, complicating the research process and extending the responsibilities of the researcher (Ramos 1989). The possibility of becoming enmeshed with subjects could also lead to researchers having difficulty in separating their own experiences from those of their subjects (Sandelowski 1986) resulting in subjectivity (Cormack 1991). In its most extreme form this is referred to as 'going native', where the researcher loses awareness of being a researcher and becomes a participant (Bryman 1988). However this may not be entirely negative in that it facilitates a better understanding of the subject, as demonstrated by Oakley (1984).

METHODOLOGY

The research processes used in the quantitative approach include descriptive, correlational, quasi-experimental and experimental research (Cormack 1991). The strengths of such methods are that both true experiments and quasi-experiments provide sufficient information about the relationship between the variables under investigation to enable prediction and control over future outcomes. This

is achieved by the ability of the researcher to manipulate an independent variable in order to study its effects on the dependent variable.

This strength can also be argued to be the weakness of the quantitative method, especially where nursing research is concerned. The methodology dismisses the experiences of the individual as unimportant, which is, demonstrated in the Bockmon & Rieman study (1987), and regards human beings as merely reacting and responding to the environment (Cormack 1991). This causes difficulties in nursing research, because nursing uses an holistic view of people and their environment and, according to Briones & Cecchini (1991), quantitative methods do not permit this approach.

The qualitative approach includes methods such as grounded theory and ethnographic research (Denzin 1978). The strength of the methodology employed lies in the fact that it has an holistic focus, allowing for flexibility and the attainment of a deeper, more valid understanding of the subject than could be achieved through a more rigid approach (Duffy 1986). It also allows subjects to raise issues and topics which the researcher might not have included in a structured research design, adding to the quality of data collected. The study by Melia (1982) is a good example of these strengths, and its findings have contributed to the knowledge of student nurses' perspective on nursing.

A weakness of qualitative methodology, is the possible effect of the researchers' presence on the people they are studying. As previously highlighted, the relationship between the researcher and participants may actually distort findings.

DATA

The data collected in quantitative research are, as mentioned, hard and numerical. The strength of producing numbers as data is that this demonstrates an ordered system. Such an approach could be viewed as being necessary in an organization as big as the NHS, for as Spencer (1983) suggests, preparing an off-duty rota for 5000 employees needs quantitative methods and a computer. This argument is also supported by Kileen's (1981) study regarding new mothers where there was a need to use numerical data to identify the nursing resources needed, number of nurses involved, and what difference they made to patient outcome, length of stay, cost-effectiveness of discharge planning and the length of the time patients stayed out of hospital before any re-admission.

The opposing argument, suggesting the invalidity of numerical findings, is that data not displaying significance are often neglected, or alternatively attention is centred on a minority of the respondents leaving the majority unexplored, in other words there are 'deviant cases' (Cormack 1991). This therefore distorts the evaluation of data.

In contrast, the soft data collected in qualitative research identify and account for any 'deviant cases' (Cormack 1991). The rich data produced provide an illuminating picture of the subject, with great attention often given to pointing out intricate details. Evidence of this is seen in the study by Melia (1982) where student nurses' comments are quoted, enabling the reader to fully understand the subject being investigated.

The comparative weakness of qualitative data concerns the likelihood that some researchers can become overwhelmed by the data collected. They may become confused by their inability to limit the scope of the study, concentrating on a few manageable areas (Bryman 1988). In this situation the research can become poorly focused and ineffective.

Reliability

Quantitative research is considered more reliable than qualitative investigation. This is because a quantitative approach aims to control or eliminate extraneous variables within the internal structure of the study, and the data produced can also be assessed by standardized testing (Duffy 1985). This quantitative strength can be seen in the comparative analysis of patients' and nurses' perceptions about nursing activities in a postpartum unit, conducted by Morales-Mann (1989).

However one can question the reliability of quantitative research, especially when the data have been stripped from the natural context, or there have been random or accidental events which are assumed not to have happened (Corner 1991).

The reliability of qualitative research is weakened by the fact that the process is under-standardized and relies on the insights and the abilities of the observer, thus making an assessment of reliability difficult (Duffy 1985). The study of Hind *et al* (1990) examined this issue and demonstrated that reliability could be assessed by using independent experts to examine various aspects of the process of developing grounded theory. However, one must question the feasibility of employing such a costly process, both in terms of time and money, to verify the reliability of a qualitative study.

Validity

Although qualitative methodologies may have greater problems with reliability than quantitative methodologies, the position is reversed when the issue is validity. The weakness in quantitative research is that the more tightly controlled the study, the more difficult it becomes to confirm that the research situation is like real life. The very components of scientific research that demand control of variables can therefore be argued as operating against external validity and subsequent generalizability

(Sandelowski, 1986). Campbell & Stanley (1963) maintain that the more similar the research experiment is to the natural setting the greater is the validity and thus generalizability of the findings. The field studies concerning perineal management by Sleep *et al* (1984) (also, Sleep 1984a, b) all contribute to the scientific understanding of this aspect of nursing. One reason that this can be claimed lies in the fact that the studies took place in a clinical environment, which increased validity.

The strength of qualitative research is proposed in the claim that there are fewer threats to external validity, because subjects are studied in their natural setting and encounter fewer controlling factors compared with quantitative research conditions (Sandelowski 1986). The researchers also become so immersed in the context and subjective states of the research subjects that they are able to give the assurance that the data are representative of the subject being studied, as seen in Oakley's (1984) antenatal clinic study. Paradoxically, the closeness of researchers also threatens the validity of the study if they become unable to maintain the distance required to describe or interpret experiences in a meaningful way, as discussed above (Hinton 1987). It is argued, however, that this is worth risking because of the high level of validity achieved by employing qualitative methodologies (Duffy 1985).

ETHICAL ISSUES

Conceptually, the ethical considerations for both quantitative and qualitative research are the same: safety and protection of human rights. These are mainly achieved by using the process of informed consent. The utilization of informed consent is problematic in quantitative research, but practically impossible in qualitative methodologies in which the direction that the research takes is largely unknown (Ramos 1989). Munhall (1988) argues that informed consent can be achieved in qualitative research by re-negotiation when unexpected events occur, but one can argue in turn that this places greater responsibility on the researchers, as well as requiring them to possess a high level of skill, especially in negotiation.

The ethical weakness of quantitative research concerns the formulation of hypotheses. In nursing there are immense ethical considerations, especially for instance when it is explained that improvements will occur in patient care when a certain approach is adopted, and the eventual findings of the research do not support this. Dewis (1989) used a qualitative approach in her study of adolescents and young adults with spinal cord injuries, because of the absence of specific previous research and the ethical dilemma of formulating a hypothesis on assumptions. The qualitative approach, for this reason alone, proved valuable for this particular nursing study.

DISCUSSION

For every strength there appears to be a corresponding weakness in both quantitative and qualitative research. It is this dilemma that has fuelled the debate over which approach is superior (Duffy 1986), and which method should therefore be adopted for nursing research. Nursing has a history of being divided, researchers in nursing can ill afford to be divided in attitudes to methodologies for this could add to the confusion and the division of the profession (Corner 1991). However, the author does not suggest that rigid uniformity about methodology should be the aim of nurse researchers, as studies have demonstrated that neither method has the upper hand or the complete set of answers.

Choosing just one methodology narrows a researcher's perspective, and deprives him or her of the benefits of building on the strengths inherent in a variety of research methodologies (Duffy 1986). Atwood (1985) disagreed with this, and argued that nursing should adopt quantitative approaches to build nursing into a science. He stated that this would provide nursing with a useful theory base with practical applications. Since this argument was posed by Atwood in 1985, studies have demonstrated that the model of measurement, prediction and causal inference does not easily fit a profession where health, illness adjustment, recovery, participation and care are frequently the variables to be measured, whilst assessing the impact of nursing practice (Corner 1991). Relying solely on a quantitative approach to answer research questions has been seen to have serious limitations (Metcalf 1983). Reliance solely on qualitative approaches has also been shown to have many limitations, although mainly of a different nature (Kileen 1984).

This debate could be seen as advantageous to nursing. Researchers are being forced to consider the controversial issues of both methodologies, and this requires them to have in-depth knowledge of epistemology and methodology and not to be restricted, as in the past, to the tradition of the physical sciences (Duffy 1985). Preference for a specific research strategy is not just a technical choice, it is an ethical, moral, ideological and political activity (Moccia 1988). This debate unearths these issues in relation to both approaches, allowing appropriate methods to be adopted by researchers in order to answer questions and develop nursing theories.

Considering the facts, it is argued that each approach should be evaluated in terms of its particular merits and limitations, in the light of the particular research question under study (Duffy 1987). However this implies that there are only technical differences between the two those of research strategies and data collection procedures (Bryman 1988). There is a suggested alternative to this, that of combining the approaches, pulling on the strengths of each method and therefore counteracting the limitations

posed by both. This research approach is called triangulation.

TRIANGULATION

The main research areas that triangulation is concerned with are issues of data, investigator, theory and methodology (Murphy 1989). Morse (1991) argues that triangulation not only maximizes the strengths and minimizes the weaknesses of each approach, but strengthens research results and contributes to theory and knowledge development. Silva & Rothbart (1984) hold a different opinion, arguing that a compromise resolution seems to ignore the significance of work presented that acknowledges various philosophies of science as factors in research and theory development. The literature demonstrates that there is no agreement between researchers about triangulation. This is not surprising when there is no agreement either about quantitative or qualitative methods, employed within the approach.

The triangulation study conducted by Corner (1991) concerning newly registered nurses' attitudes to and educational preparation for caring for patients with cancer, illustrates both the strengths and weaknesses of the approach.

The study revealed a richer and deeper understanding of the subject matter than would otherwise be possible. Quantitative and qualitative approaches were found to complement each other while the inadequacies of each were actually offset. However, it also highlighted the time and cost implications. The volume of data produced was immense and an extremely broad knowledge base was required to analyse it, which meant that other researchers were contracted in to work on different parts of the analysis. These findings are similar to those of Murphy (1989) who used the method of triangulation to study traumatic life events.

Considering the evidence, it seems reasonable to suggest that triangulation is not the way forward for all nursing research but that it may help nursing to remove itself from the bipolar debate and restrictions, especially in the light of current financial constraints on health professions.

CONCLUSION

Although quantitative and qualitative methods are different, one approach is not superior to the other, both have recognized strengths and weaknesses and are used ideally in combination. It can therefore be argued that there is no one best method of developing knowledge, and that exclusively valuing one method restricts the ability to progress beyond its inherent boundaries. Recognizing the tension between researchers about quantitative and qualitative research, and attempting to understand it, may serve to create relevant and distinctive modes of enquiry in

nursing. It may also help the unification rather than the division of nursing scholars.

From examining research in nursing, qualitative approaches appear to be invaluable for the exploration of subjective experiences of patients and nurses, while quantitative methods facilitate the development of quantifiable information. Combining the strengths of the methods in triangulation, if time and money permits, results in the creation of even richer and deeper research findings. It seems that nursing research has the potential to provide a valuable resource for the health care system. As nursing discovers and uses different methodologies, it will assist in creating the necessary balance in the knowledge required to develop nursing as both a science and an art.

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