

CHAPTER 3

RESEARCH DESIGN AND METHOD

3.1 INTRODUCTION

In this chapter the researcher explains how the research study was conducted. A quantitative, descriptive study was conducted to determine:

- how computer assisted instruction was applied at the time of data collection
- the benefits of computer assisted instruction and computer-based learning for the learners
- the problems that the learners encountered during computer-based learning.

The views of second and third year learners of a nursing college in the Gauteng Province of South Africa were obtained, by administering a structured questionnaire. The entire population was involved in the study. Data collection elicited descriptive data, which were submitted to descriptive statistical analysis. The Mann-Whitney U-test was performed to determine whether differences existed between the responses of the second and those of the third year learners. The researcher employed various measures to enhance data quality. She ensured that the ethical principles of research were complied to.

3.2 RESEARCH DESIGN

A *research design* is the overall plan for obtaining answers to the questions being studied and for handling some of the difficulties encountered during the research process (Polit & Beck 2004:49). Research designs are developed to meet the unique requirements of a study. According to De Vos (1998:123) a research design is a blueprint or a detailed plan for how a research study is conducted. Polit and Beck (2004:209), and Wood and Haber (1998:157) indicated that selecting a good research design should be guided by an overarching consideration, namely whether the design does the best possible job of providing trustworthy answers to the research question.

To achieve the research objectives and to address the research problem the researcher conducted quantitative research. A quantitative research generates quantifiable data. It is primarily concerned with observable and measurable phenomena involving people, events or things, and establishing the strength of the relationship between variables, usually by statistical tests (Couchman & Dawson 1995: 40). A quantitative research lends itself to investigating phenomena that require precise measurement and quantification often involving a rigorous and controlled design (Polit & Beck 2004:729). A quantitative design tends to be fairly structured to enhance objectivity. A quantitative research primarily rests upon numbers aggregated into statistics, to enable the researcher to interpret obtained data and reach conclusions (Cormack 1996:113). The features of this research study are in accordance with the quantitative research paradigm. Its focus was concise and narrow. The researcher exercised control by enhancing the external validity of the study. She utilised a structured questionnaire, which enabled her to quantify the responses and to conduct statistical analysis. The researcher maintained objectivity through structured data collection. Furthermore, an in-depth literature review, which served as a basis for the development of the data-collection instrument, was conducted. According to Wood and Haber (1998: 157), objectivity in the conceptualisation of the problem is derived from a review of the literature and the development of a theoretical framework. A literature review enables the researcher in assessing the depth and breadth of available knowledge concerning the research problem.

In this present study, the researcher considered the most suitable research design to be a non-experimental, univariate, and descriptive survey design. The term survey can be used to designate any research activity in which the investigator gathers data from a portion of a population for the purpose of examining the characteristics, opinions or intentions of that population (Couchman & Dawson 1995: 70; Polit & Beck 2004:234). A descriptive design is selected because of its high degree of representativeness and the ease in which a researcher could obtain the participants' opinion (Polit & Beck 2004:50). In this present study, the researcher obtained and described the views of the respondents with regard to the nature of their exposure to computer assisted instruction, the benefits of this exposure, and the problems that they experienced while they were engaged in computer-based learning. The focus of this study was on a single variable, namely certain *views*. When very little is known about a topic or to explore a research question, a descriptive design is applied. Within the context of this research, the views of nursing learners on computer assisted instruction and computer-based learning had not been documented before at the selected nursing college. In descriptive research the research variable is examined, as it exists without investigator

interference. Control over the research setting is limited (Brink & Wood 1998: 289-291, Burns & Grove 2001:201). In this study there was no manipulation of variables and the researcher did not attempt to control the research setting. However, the data collection conditions were standardised to enhance data quality.

3.3 RESEARCH METHOD

The research method is discussed by referring to sampling, data-collection and data-analysis.

3.3.1 Population and sampling

Polit and Beck (2004:289) define a *population* as the entire aggregation of cases that meet a designated set of criteria. The target population is the aggregate of cases about which the researcher would like to make generalisations (Polit & Beck 2004:290). The target population for this present study was second and third year nursing learners following the 4-year Diploma Programme Leading to Registration as a Nurse (General, Psychiatric and Community) and Midwife, at a nursing college in the Gauteng Province of South Africa. They had been exposed to computer assisted instruction during their training and were required to draw upon those experiences to complete the questionnaire. All second and third year nursing learners willing to participate in this present study were included. The reasons for involving the entire population was that it was of a manageable size, and that data was collected in a localised setting.

Polit and Beck (2004:290) define *eligibility criteria* as the criteria that specify the characteristics that people in the population must possess, to be considered for inclusion in a study. The eligibility criteria for inclusion in the study under discussion were that they had to:

- be registered for the Diploma Programme Leading to Registration as a Nurse (General, Psychiatry and Community) and Midwife, at the specified nursing College
- be in their second or third year of study
- have been exposed to computer assisted instruction during the course of their studies.

Table 3.1 indicates the number of questionnaires distributed and returned and the response rates for both groups of respondents. With regard to the second year learners, 225 questionnaires were

distributed, and 172 were returned and duly completed. The response rate was therefore 76%. Concerning the third year learners, 135 questionnaires were distributed, and 119 were returned and processed. The response rate was therefore 88%. According to Babbie and Mouton (2001: 261) a response rate of more than 70% is considered to be very good.

Table 3.1 Response rates

Level of training	Number of questionnaires distributed	Number of questionnaires returned	Response rate
2 nd Year	225	172	76%
3 rd Year	135	119	88%

3.3.2 Data collection

In this section, the researcher discussed the data collection approach, method, instrument and process.

3.3.2.1 Approach and method

Polit and Beck (2004:716) define *data collection* as the gathering of information needed to address a research problem. Structured data collection is applied in quantitative research. Structured data collection entails asking a fixed set of pre-defined questions that are generally answered in a specified sequence. The respondents choose between well-designed response options. Structured data collection enhances objectivity. *Objectivity* refers to the degree to which two independent researchers can arrive at similar ‘scores’ or make similar observations regarding the concepts of interest. It also yields data that are easy to analyse (Polit & Beck 2004:319).

In this present research study, the researcher applied a self-report method through which the respondents responded in a pen and paper format on a structured questionnaire. The researcher intended to elicit data about the respondents’ views on various aspects pertaining to their past computer-based learning experiences. A structured, self-report method allows the respondents to respond directly in writing. It enables a researcher to gather retrospective data about activities that have occurred in the past, or gather projections about behaviours which people plan to engage in the future (Polit & Beck 2004:320).

3.3.2.2 Data collection instrument

Various aspects pertaining to the data collection instrument are discussed in the following sections.

- *Nature of the instrument*

In this research study, a self-administered structured questionnaire (refer to Annexure A) was administered. Polit and Beck (2004:729) define *questionnaire* as an instrument for gathering self-report information from respondents through self-administration of questions in a paper-and-pencil format. The utilisation of structured questionnaires enhances the objectivity and support statistical analysis. The respondents respond to a series of pre-developed questions posed by the researcher (Polit & Beck 2004: 235). The questionnaire for this present study contained pre-developed closed-ended items and a rating scale with pre-determined response options. Both categories of respondents responded to the same items. The items were derived from the literature review. According to De Vos (1998:157), the covering letter is an integral part of the questionnaire. The researcher therefore wrote a covering letter and attached it to the questionnaire (refer to Annexure F). The covering letter covered information about the nature of the research study and the value of the respondents' participation.

As indicated in table 3.2, the questionnaire addressed aspects related to the research objectives (refer to section 1.5.2). It comprised six sections. Section A elicited nominal data except for the item on the respondents' age, which was on the ratio level of measurement. Sections B-E supported an ordinal level of measurement. A 4-point Likert scale was applied. Scales are utilised to enable respondents to report their attitudes or feelings in a continuum (Brink 2000:160). The response options for sections B and C were *daily, monthly, weekly and never*. The response options for section D and E were *strongly agree, agree, disagree and strongly disagree*. In section F, the respondents were required to indicate their preferences between computer assisted instruction and traditional teaching strategies. Section F elicited nominal data.

Table 3.2 Division of the questionnaire

SECTION	NUMBER OF ITEMS	LEVEL OF MEASUREMENT	ASPECTS COVERED
A	6	Ratio (Item 1) Nominal (Items 2- 6)	Biographical data
B	9	Ordinal	Frequencies to which learners have been exposed to different types of computer software packages
C	13	Ordinal	Frequencies to which learners have been engaged in the activities associated with computer assisted instruction
D	41	Ordinal	Benefits that the learners encountered with regard to computer assisted instruction
E	30	Ordinal	Problems that the learners encountered with regard to computer assisted instruction
F	2	Nominal	Preferences between computer assisted instruction and traditional teaching strategies

- *Pre-testing of the instrument*

It was not feasible to conduct a pilot study because at the Nursing College where the study was conducted, a block system is applied and learners were not available prior to data collection. The researcher therefore pre-tested the questionnaire. Pre-testing of an instrument is done to determine its feasibility and validity (Brink & Wood 1998:259). *Validity* refers to the degree to which an instrument measures what it is supposed to be measuring (Polit & Beck 2004: 422). In this present study, the researcher pre-tested the questionnaire prior to data collection to enhance its validity. The questionnaire was assessed for face validity and content validity. *Face validity* refers to whether the instrument appears as though it is measuring the appropriate construct (Polit & Beck 2004: 423). *Content validity* is defined as the sampling adequacy of items for the construct that is measured (Polit & Beck 2004: 423).

In this present study, the researcher submitted the questionnaire to four experts in the field of nursing education. Criteria for evaluating the questionnaire were provided. The criteria related to technical soundness, item clarity and relevance of the items (refer to Annexure E). The questionnaire was refined by incorporating the suggestions of the experts. Most of the

recommended changes related to minor grammatical aspects. Furthermore, a statistician assessed the questionnaire to determine whether any irregularities existed that might hinder data-analysis. The statistician did not propose any amendments.

- ***Reliability***

Reliability means the likelihood of obtaining the same results when the researcher measures the same variable more than once, or when more than one person measures the same variable (Brink 2000:157). Reliability therefore relates to the measurement accuracy of the data collection instrument. An instrument can be said to be reliable if its measurement accurately reflects the true scores of the attribute under investigation (Polit & Beck 2004:416).

In this present study, the instrument was submitted to reliability testing after completion of data-collection. The researcher calculated the Cronbach's Coefficient Alpha scores. The Cronbach's Coefficient Alpha was calculated to test the reliability of the questionnaire, with specific reference to its internal consistency. It is the most widely used statistic for evaluating internal consistency, and its scores communicate reliability statistics. It measures the extent to which the performance on any one item of an instrument is a good indicator of the performance in any other item in the same instrument (Brink 1990:160). This was done to determine whether the researcher concentrated only on the one trait, which was measured in each individual section. The following table (Table 3.3) indicates the Cronbach's Coefficient Alpha scores of the various sections of the instrument. None of the items had to be eliminated from the questionnaire based on the reliability scores for individual items.

Table 3.3 Cronbach's Coefficient Alpha scores

SECTIONS	CRONBACH'S COEFFICIENT ALPHA	NUMBER OF ITEMS
B	.864	9
C	.849	13
D	.978	41
E	.920	30

3.3.2.3 Data collection process

The researcher secured the participation of the nurse educators who were responsible for the second and third year learners respectively. These nurse educators facilitated access to the respondents. The researcher consequently personally distributed the questionnaires during the learners' free classroom periods. The respondents completed the questionnaires on the day of distribution. They spent approximately 40 minutes to complete the questionnaire. The researcher was available to answer questions or to address problems. Afterwards the researcher personally collected back the completed questionnaires.

3.3.2.4 Data analysis

Polit and Hungler (1999:699) refer to *data analysis* as the systematic organisation and synthesis of research data, and the testing of a research hypothesis using those data. This research study was descriptive in nature and therefore descriptive statistics were calculated. Descriptive statistics enable a researcher to reduce, summarise and describe quantitative data obtained from empirical evidence (Polit & Beck 2004:716).

To enhance data management, the researcher coded the respondents' responses in preparation for data capturing, using SPSS12.0 for Windows. The coding system for each section in the questionnaire is indicated on the questionnaire (refer to Annexure G).

With regard to the nominal data, the researcher calculated frequency statistics and the modes. The items, which were measured on the ordinal level, were subjected to calculating the frequencies, medians and means. The means were only calculated for statistical purposes, namely to serve as basis for calculating the Mann-Whitney U test scores. The descriptive statistics were calculated to summarise the learners' responses to each item. In addition to descriptive statistics, the Mann-Whitney U-test was applied to determine whether there were any differences between the responses of the second year learners and those of the third year learners with regard to each item in sections B to E. This was however, not hypothesis testing research in the sense that the relationships between variables were measured. A null hypothesis was formulated which stated that no differences existed between the responses of the two groups of respondents with regard to each item. The chosen level of significance was 0.05. A significant difference obtained on an item would mean that there was a

difference between the responses of the groups of learners. The researcher interpreted differences obtained with due consideration of how each item was formulated.

3.4 VALIDITY OF THE STUDY

Descriptive research is low in terms of internal validity and high in terms of external validity. Descriptive research allows for limited control over the research variables and the research setting. Control over sample selection is however possible and it is necessary to involve a large representative sample to enhance external validity (Brink & Wood 1998:291). External validity is defined as the degree to which the study results can be generalised to other people and other research settings (Brink 2000:209). In this present study the entire population was used and it was therefore not necessary to generalise the findings to the population. Considering the fact that learners from only one college participated in the study, the researcher did not attempt to generalise the findings beyond the nursing college involved.

3.5 ETHICAL CONSIDERATIONS

Research ethics is referred to as a system of moral values that is concerned with the degree to which research procedures adhere to professional, legal and sociological obligations to the study participants (Polit & Beck 2004:717). In this present research study, the researcher complied with the ethical guidelines as described by the Democratic Nursing Organisation of South Africa (DENOSA) (1998) and Polit and Hungler (1999:131). The researcher further complied with research ethics code of the nursing college involved.

3.5.1 Protection of the rights of the institutions involved

The research proposal was submitted to the Research Ethics Committee of the department in which the researcher was registered as a post-graduate learner. This committee approved the proposal and gave permission for the study to be conducted.

The college principal advised the researcher to submit a letter for requesting permission to conduct a study involving the nursing learners in that institution. A research proposal had to be included in this request. The principal also advised that the researcher should request permission from the

Gauteng Department of Health, and that the response of the Department should be submitted to the college (Annexure C). Written applications to secure consent to conduct the study, were directed to Gauteng Department of Health (Annexure A) and to the principal of the nursing college involved (Annexure B).

The researcher obtained verbal permission from the nurse educators in charge of the second and third year learners. The heads of the departments of the second and third year learners confirmed, in writing, suitable dates for data collection (Annexure D).

The researcher availed herself to the nursing college's ethical requirements regarding research, and consented to abide to them. The researcher did not impose on the teaching schedules of the nurse educators, and therefore no valuable learning time was lost. The name of the nursing college where this present study was conducted was not mentioned for confidentiality purposes. The researcher refrained from divulging information about the college with people who were not directly involved in the study. The researcher undertook to send a copy of this dissertation to the Gauteng Department of Health, the nursing college where the study was conducted, and the researcher's employer.

3.5.2 Protection of the respondents

The researcher obtained informed consent from the research participants. Informed consent means that participants have adequate information regarding the research, are capable of comprehending the information and have the power of free choice, enabling them to consent or decline participation in the research (Polit & Beck 2004: 151). The researcher introduced herself to the respondents indicating her title and position. Detailed explanations of the nature and purpose of the study, and the importance of their participation were given. They were assured that participation in the study was voluntary and failure to comply would not result in any penalties. The researcher gave the respondents her contact address in case they needed to contact her regarding the study and their participation.

The researcher committed herself to maintaining anonymity and confidentiality. The respondents were assured that anonymity and confidentiality would be maintained. *Anonymity* occurs when even the researcher cannot link a participant with the information for that person (Polit & Beck 2004:711). *Confidentiality* is maintained when participants are protected in a study such that

individual identities are not linked to the information provided, and are never publicly divulged (Polit & Beck 2004:712). The researcher anticipated that a fear of victimisation might result in reluctance, on the part of the learners, to honestly respond to the items, which related to the nurse educators' performance and the quality of the computer assisted instruction at the college. The researcher asked the respondents not to write their names and other personal details on the questionnaire forms. The researcher marked the questionnaires by giving each a number to assist in data capturing and checking during the phase of data management. The researcher refrained from discussing the responses with others. Only the researcher and the research supervisors had access to the completed questionnaires and raw data.

3.5.3 Scientific integrity

The integrity of scientific knowledge was protected by applying the principles as stipulated by Babbie and Mouton (2001:526-528). The following measures of scientific integrity were respected by the researcher:

- The researcher refrained from forging the data, and reporting on something, which is non-existing or does not reflect what has actually been done.
- The researcher avoided plagiarism by presenting her own work and ideas.
- Sources consulted and all persons who contributed to the study were acknowledged.
- The researcher refrained from distorting findings to support preconceived views.
- The participants were not influenced in their responses to support views held by the researcher.

3.6 CONCLUSION

A quantitative, descriptive research was conducted to determine the views of nursing learners with regard to various aspects related to computer assisted instruction at a specific nursing college. Second and third year learners participated in the study. They were invited to indicate their views on various aspects of their computer-based learning experiences. The entire population was involved in the study. Data was collected by means of a structured questionnaire comprising mainly of closed-ended questions and a Likert scale. The raw data was submitted to descriptive statistical analysis, and the Mann-Whitney U-test. The researcher employed various measures to enhance data quality

and to ensure that ethical principles were complied with. In the following chapter, the research findings are discussed.