

A Quantitative Study Research Critique

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Abstract

A critique of a quantitative research study is done. An article entitled, *The use of personal digital assistants at the point of care in an undergraduate nursing program*, by Goldsworthy, Lawrence, & Goodman (2006) is appraised. The Nieswiadomy (2007) text entitled, *Foundations of nursing research*, is used for comparison. Each section of the article is evaluated. First, support is given from the article, then evidence is provided from the text, and finally an analysis is conducted between the two. The purpose of this is to address both the strengths and weaknesses of the research article.

Keywords: quantitative research, critique, support, evidence, analysis

A Quantitative Research Study Critique

Nursing research is defined as “the systematic, objective process of analyzing phenomena of importance to nursing” (Nieswiadomy, 2007, pg. 5). Nursing research has four main goals. These goals include: “promoting evidence based nursing practice, ensuring credibility of the nursing profession, providing accountability for nursing practice, and documenting the cost effectiveness of nursing care” (Nieswiadomy, 2007, pg 8).

There are two types of nursing research, quantitative research and qualitative research. Quantitative research is “concerned with objectivity, tight controls over the research situation, and the ability to generalize findings” (Nieswiadomy, 2007, pg 10). Qualitative research is “concerned with the subjective meaning of an experience to an individual” (Nieswiadomy, 2007, pg. 11).

A research critique “involves a thorough examination of all the parts of the study” (Nieswiadomy, 2007, pg. 378). “A critical evaluation of all the sections of a research report is essential in determining the usefulness of the research results” (Nieswiadomy, 2007, pg. 387). All research studies contain both strong and weak points. The purpose of critiquing a research study is to assess the study’s strengths as well the study’s weaknesses (Nieswiadomy, 2007).

This paper is a critique of a quantitative research study entitled, *The use of personal digital assistants at the point of care in an undergraduate nursing program*, by Goldsworthy, Lawrence, & Goodman (2006). Each section of the research article will be evaluated. First evidence from the article will be given. This section will include actual information from the corresponding section of the article. Then, it will be followed by support from the Nieswiadomy (2008) text entitled, *Foundations of nursing research*. This section will include what the text actually says should be included in this portion of the research. Finally, an analysis will follow.

In this section, the evidence (what is contained in the article) and the support (what the text says should be contained in the article) will be compared and contrasted. If any gaps exist, they will be mentioned. Also, the analysis section will contain whether this section of the research was strong or weak. The support, evidence, and analysis will be applied to all the sections of the research article, the purpose and problem statement, the review of literature, the theoretical/conceptual model, the hypothesis and research question, the research (study) design, the sample and sampling methods, the data collection methods, the instruments, the data analysis of both descriptive and inferential statistics, the study findings, and finally the study conclusions, implications, & recommendations.

Purpose and Problem

Evidence

The focus of the article by Goldsworthy et al. (2006) is to determine if the use of personal data assistants (PDA's) by student nurses in an undergraduate nursing program is beneficial. At the beginning of the article, the authors discuss the fact that nursing students carry around many reference books. Not only are these books heavy and cumbersome, but they can often times contain outdated information. The authors chose to focus on the following research question. "Does the use of a PDA by second-year Bachelor of Science in Nursing students in the medical-surgical environment influence the students' preparedness for the safe administration of medications and enhance the students' self-efficacy?" (Goldsworthy et al., 2006, p. 138).

Research is being done by the authors to determine what the impact is of PDA's on nursing education. The article further states the study is the first of this kind. This is a pilot study. So, the authors are determining if and how more testing and research might be conducted (Goldsworthy et al., 2006).

Support

According to Nieswiadomy (2007) “the problem statement of a study contains *what* will be examined by the researcher, or the content of the study, whereas the purpose statement of the study contains *why* the study will be conducted” (p. 77). Many nursing studies contain only a purpose statement and not a problem statement. This statement is generally located at the start of the article (Nieswiadomy, 2007).

The text goes on to describe the criteria for a problem statement. There are two ways a problem statement can be written. These include a declarative form and an interrogative form, which is a question format. The problem or purpose statement must be clear and concise. The population must be stated in the problem statement and it must not be too broad. Next, the variables, which will be included in the study, must be stated. The research problem must be empirically testable. For the problem to be empirically testable, empirical data must be used. Empirical data is data gathered through the sense organs or equipment which assists the senses (Nieswiadomy, 2007).

Analysis

The problem of the article is clear and concise. The problem section of the research is strong. The research article meets the criteria of a research question according to the Nieswiadomy (2007) text. The article by Goldsworthy et al. (2006) clearly states a problem for the article. The problem is “does the use of a PDA by second-year Bachelor of Science in Nursing students in the medical-surgical environment influence the students’ preparedness for the safe administration of medications and enhance the students’ self-efficacy?” (Goldsworthy et al., 2006, p. 138). This statement contains the content of the study or *what* will be researched (Nieswiadomy, 2007).

There are two purposes of this research. The first purpose is to determine if the use of PDA's is beneficial for student nurses. The second purpose is to determine if and how further research should be conducted, due to the fact that this is the first study being done on the topic (Goldsworthy et al., 2006). According to Nieswiadomy (2007) the purpose is *why* the study is being conducted. The purpose was stated in the introduction of the article. However, the authors do not make a specific statement related to the purpose of their research. While the information is there, it is discussed with in the paragraph, rather than a clear and concise statement.

The problem of this article is stated in an interrogative form, a question is asked. The population is narrowed down and not too broad, which according to Nieswiadomy (2007) is the proper way to identify the population. The population discussed in the problem statement is "second-year Bachelor of Science in Nursing students in the medical-surgical environment" (Goldsworthy et al., 2006, p. 138). Next, the variables are discussed. The variable contained in the study by Goldsworthy et al. (2006) is the PDA. Lastly, empirically testable data from the article by Goldsworthy et al. (2006) is "the students' preparedness for the safe administration of medication and the students' self-efficacy" (pg. 139).

Review of Literature

Evidence

The review of literature section by Goldsworthy et al. (2006) discusses how most of the current literature is "limited to descriptions of PDA's and the benefits they can provide in the clinical area" (p. 139). One study reviewed discussed the use of PDA's by medical residents. However, the applications used were chosen by the study participants. Another area the authors discussed was in regards to e-prescribing and ordering lab tests (Goldsworthy et al., 2006).

Goldsworthy et al. (2006) says that much of the literature regarding PDA's and nursing is recent. The literature the authors utilized states some of the benefits of using PDA's. PDA's save time, contains up-to-date information, and is more convenient. The literature also describes how nursing instructors can keep up-to-date student records.

The authors also researched self-efficacy. Self-efficacy is how one will react in a situation. Self-efficacy is related to success in nursing education. Also the higher the self-efficacy, the better students will overcome obstacles (Goldsworthy et al., 2006).

Support

According to Nieswiadomy (2007) the most important reason for reviewing the literature is to "determine what is already known about the topic" (p. 89). "Another purpose of the review of literature is to help plan the study methodology" (p. 90). This may aid the researcher in the selection of the appropriate tools and methods in which to conduct the study. The text further states, that this may help the researcher learn what works and what does not work.

Nieswiadomy (2007) discusses two types of literature sources, primary and secondary. The primary study is the original study written by the original investigator. The secondary source is a summary of a research study written by someone else. It is best to use primary sources to avoid misinterpretations.

The review should be clear and concise and contain mostly paraphrases with minimal direct quotes. Sources should all be relevant to the topic being researched. The literature review should contain recent references (not more than five years old) and older studies (if the topic has been studied for many years). Sources should be scholarly. Also, all references should be sourced and cited in the reference list (Nieswiadomy, 2007).

Analysis

The review of the literature is weak. This may be due to the fact that this is a relatively new subject and has not been researched in great detail. According to Nieswiadomy (2007) sources should be relevant to the study topic. This is the biggest weakness in this section. Goldsworthy et al. (2006) discusses the use of PDA's by medical residents and well as the use of e-prescribing and lab ordering. This is not relevant to the use of PDA's by nursing students. Nursing students are not going to be prescribing medications or ordering labs.

The authors of the article research self-efficacy, but it is not in relation to the use of PDA's. The article has minimal information regarding the use of PDA's in the clinical setting. There is literature regarding the use of PDA's in reducing medication errors. However, in the article it is not stated who this applies to. The references must be viewed and this information is in regards to nurses in an advanced practice (Goldsworthy et al., 2006).

The literature reviewed is recent, which according to Nieswiadomy (2007) is important. Most of the literature reviewed by Goldsworthy et al. (2006) is from 2000-2005. This topic has not been studied for many years, so older studies would not have been conducted. Most of the literature reviewed by the authors is from primary sources and is scholarly. When viewing the references most appear to be from journals, such as *AACN* and *Nurse Educ*.

Theoretical/ Conceptual Model

Evidence

According to article titled "The Use of Personal Digital Assistants at the Point of Care in an Undergraduate Nursing Program" written by Goldsworthy, Lawrence, and Goodman four questions emerge regarding to theory. The focus of the article is on BSN students in the medical surgical setting. The main idea is if PDA's can improve the students learning experience in the following ways. The article begs questions relating to increased safety of medication

administration, improvement of student self efficacy in the clinical setting, student perception of improved time management and organizational skills, and increased student confidence in locating information for patient care, and teaching (Goldsworthy, pp.139). Theories are composed of concepts, and the relationships between these concepts (Nieswiadomy , pp 107). The concepts relating to this particular article are nursing students that utilize PDA's, and if PDA's improve student learning outcomes. It is thought that using modern technology will help the student be more comfortable in their learning environment. Therefore, concept can be simply thought of as feelings of increased self learning ability. Besides the student's feelings of increased self confidence in accessing information to better care for their patients, the theory also brings attention to the correlation of reduced medication errors and the use of PDA's.

Support

Conceptual models are made up of concept and propositions that state the relationship between the concept and are generally abstract and not readily observable (Nieswiadomy, pp. 108). The applied conceptual model in the related article is if nursing students have an increased feeling of confidence when using the PDA's. The idea would be of interest to the nursing community because the learning environment for nursing students would be improved based on feelings of improved self confidence. Due to the fact that feeling of increased self confidence cannot be empirically measured this makes it a clear concept in theory.

Analysis

Theory can be thought of as a set of related statements that describes or explains phenomena in a systematic way (Nieswiadomy, pp. 107). The framework for the study is identified easily in the article and is the relationship between the student and the PDA. As noted above there are many concepts involved including self confidence, improved medication administration, efficient time management, and better organizational skills. However, the article does not combine other theories from nursing or other professions. Combining other theories can help guide research more appropriately (Nieswiadomy, pp. 117). The article focuses only on the appointed questions to be answered and does not take into consideration other studies to help aid in conclusions.

Hypothesis and Research questions

Evidence

The Goldsworthy, Lawrence, & Goodman (2006) article contained two research questions. The article focused on BSN students in the medical-surgical clinical environment. The two questions asked were, “Does the PDA influence the students’ preparedness for the safe administration of medications? “Does the PDA enhance the students’ self-efficacy? (Goldsworthy et al. pp.139). A possible hypothesis can be drawn from the introduction of the article, “A student with a PDA equipped with the current necessary resources can dispense with heavy textbook and other awkward resources and will instantly have access to the most current and applicable information for the care of the acute medical-surgical patient” (Goldsworthy et al. pp.138).

Support

Problem statements present the question to be asked in the study, the hypothesis presents the answer to the question, and provides the reader with an understanding of the researcher's expectations about the study before data collection begins (Nieswiadomy, 2007). Hypotheses typically written in declarative sentences, and is one of the major differences between the problem statement and the hypothesis for study (Nieswiadomy, pp. 132).

Analysis

The hypothesis in the Goldsworthy, Lawrence, & Goodman (2006) article is weak because it is not clearly stated. The article should contain a hypothesis because it is not considered qualitative research (qualitative research does not require a hypothesis). The reader had to guess at a possible hypothesis which can confuse the purpose and clarity of the study. Most hypotheses are easy to recognize because they are written in declarative form. The questionable hypothesis does support a declarative writing style because it presents a solution to the possible problem (Nieswiadomy, pp. 132). Therefore, it is the only reason the reader believes this may be a possible hypothesis.

Research (Study) Design

Evidence

The research design in Goldsworthy, Lawrence, & Goodman (2006) article was an exploratory study. The study is also considered experimental research, and extraneous variables.

Support

Exploratory studies are conducted when little is known about the topic of interest (Nieswiadomy, pp. 167). There is little information available on the influence of PDA's correlating with nursing student success therefore to label the research design as an exploratory study is appropriate. The research design is also considered experimental research. It is concerned with cause-and-effect relationships and involves manipulation or control of the independent variable and measurement of the dependent variable (Nieswiadomy, pp.146). The cause can be the use of PDA's, the effect can be considered as the success of the nursing student that uses the PDA's as compared to the nursing students that do not use them. Extraneous variables in the research design are variables that the researcher is not able to control, or does not choose to control, and may influence the results of the study, these variables are the students.

Problem statements present the question to be asked in the study, the hypothesis presents the answer to the question, and provides the reader with an understanding of the researcher's expectations about the study before data collection begins (Nieswiadomy, 2007). Hypotheses typically written in declarative sentences, and is one of the major differences between the problem statement and the hypothesis for study (Nieswiadomy, pp. 132).

Analysis

The Goldsworthy, Lawrence, & Goodman (2006) article is an exploratory study because it represents a case-control experiment on the possible impact of using PDA's in nurse education, and may be among the first in this category (Goldsworthy et al. pp.138). There are not many studies done on evaluating the use of technology to improve student learning outcomes therefore it can also be thought of as a pilot study. Extraneous variables are used in the study and are the

students. Due to the fact that humans are in fact the variable it may alter the results of the study because the researcher cannot manipulate the students. Threats to the internal validity of the study can come from selection bias because some students may not be available at all times throughout the study or through mortality if the student drops the class or refuses to participate in the study.

Sample and Sampling Methods

Evidence

The sample for the research done by Goldsworthy et al. (2006) “consisted of 36 second-year baccalaureate nursing students who were randomly assigned to either a PDA or a control group” (p. 140). Students were recruited from the class of eligible students. The study was conducted in two acute care hospitals in southeastern Ontario. There were two professors who were responsible for the groups. Each professor was responsible for one control group and one PDA group (Goldsworthy et al., 2006).

Support

It is difficult to gain access to an entire population when conducting research. Therefore, a sample or subset of the population is used to represent the population. First, the target population must be selected. The target population is “composed of the entire group of people or objects to which the researcher wishes to generalize the findings of the study” (Nieswiadomy, 2007, p. 188). The samples are then chosen from the accessible population, or available group (Nieswiadomy, 2007).

There are two types of sampling methods, probability sampling and nonprobability sampling. In probability sampling a random selection process is used. In nonprobability

sampling a nonrandom process is used. Nonrandom sampling is more likely to result in a bias (Nieswiadomy, 2007).

There are four types of probability sampling (sampling which uses a random method). The first type is simple random sampling. This type of sampling enables each element of the population to have an equal chance of being chosen. With this method, a number is assigned to each member of the population. The numbers are randomly arranged in a table and then the researcher randomly selects the desired amount of numbers (Nieswiadomy, 2007).

The next type of probability sampling is stratified random sampling. With this form of sampling the population is subdivided into groups depending on important variables. Then a simple random sample is taken (Nieswiadomy, 2007).

Another type of probability sampling is cluster random sampling. This type of sampling is used if the population is geographically spread out. "Groups rather than people are selected from the population. Successive steps of selection are done and the sample is randomly selected from the clusters" (Nieswiadomy, 2007, p. 191).

The final type of probability sampling is systematic random sampling. For this type of sampling a list of the population is obtained and the sample size is determined. Next, the sampling interval is determined ($k = N/n$). A random starting point is selected and then every k th element is chosen (Nieswiadomy, 2007).

Three types of no probability sampling methods, or nonrandom methods, are discussed. The first is convenience sampling. This type involves choosing "readily available people or objects for a study" (Nieswiadomy, 2007, p. 197).

The next type of nonprobability sampling is quota sampling. This type involves dividing the population into subgroups which are alike and then selecting samples from these groups.

However, samples are then obtained through convenience sampling methods (Nieswiadomy, 2007).

The final type of nonprobability sampling is purposive sampling. In this type of sampling members are handpicked by the researcher. The members are selected based on what the researcher believes is representative of the population (Nieswiadomy, 2007).

The time frame for research studies can be classified as longitudinal or cross-sectional. In a longitudinal study, subjects are followed over a period of time in the future. In a cross-sectional study, participants are studied at one point in time (Nieswiadomy, 2007).

The size of the sample is dependent upon many variables. When the population is very alike, a small sample size may be sufficient. However, large sample sizes are more precise and representative of the population. It is best to make the sample size a little larger to allow for subjects who are nonresponsive or dropout. Also, the sample should be large if subgroups are needed (Nieswiadomy, 2007).

Analysis

The sample portion from the article by Goldsworthy et al. (2006) is weak. There is minimal information disclosed regarding the sample that was studied. Researchers make decisions based on the information from samples and inadequate samples can have negative consequences (Nieswiadomy, 2007).

The target population Goldsworthy et al. (2006) selected was undergraduate nursing students. From this population a sample was selected. The “sample consisted of 36 second-year baccalaureate nursing students” (Goldsworthy et al., 2006, p. 140). The population that this sample was selected from was a class of eligible students from a university. The authors never state which university this sample was selected from. According to Nieswiadomy (2007) the

population which the sample was selected from may not always be discussed. While the population is mentioned in the article, it is not discussed in great detail. The university students would, however, be considered the accessible population. The authors never discuss if the sample is representative of the accessible population because the number of the accessible population is never revealed. Which, according to Nieswiadomy (2007) should be discussed. The number of the accessible population should be disclosed to enable the reader to know if the sample is representing only a fraction of the accessible population or a larger section of the group (Nieswiadomy, 2007). In this article it is unclear as to whether the sample is representative or not.

“The specific type of probability or nonprobability sampling method should be presented” (Nieswiadomy, 2007, p. 205). The article by Goldsworthy et al. (2006) says the participants for the study were recruited. However, specific sampling methods are not explored within the article. Since the subjects for the study were recruited, a nonprobability or nonrandom sampling method was probably used. According to Nieswiadomy (2007) this method of sampling can form a bias. However, the text further states that this is the most common type of sampling used in nursing research studies because it is convenient and available. Since the subjects were recruited, convenience sampling was probably used. This is the most common type of sampling method in nursing research because it saves both time and money (Nieswiadomy, 2007).

The study by Goldsworthy et al. (2006) was most likely a longitudinal study. The study took place over a period of time. Nieswiadomy states if research is conducted over a time period, even if it is a short time period, it is considered a longitudinal study. Also if the researcher is interested in changes which occur, this is the type of study which should be used.

The authors of the article never discuss why 36 students were chosen for this study. According to Nieswiadomy (2007) rationale for the sample size selected should be disclosed. Also subject drop out is never discussed within the article.

Measurement and Collection of Data

Evidence

Goldsworthy et al. (2006) collected data about the influence of PDA's on nursing student's self-efficacy and the safe administration of medications. Students were divided into four groups. The groups included two experimental groups (with PDA's) and two control groups (without PDA's). There were two instructors and two locations. Each instructor had a variable group and a control group. The groups were homogeneous (Goldsworthy et al., 2006).

The authors used two instruments to collect the data. These instruments included a 10-item general self-efficacy scale and a safety tool for medication administration. The authors collected the data. The self-efficacy tests were administered both pre and post use of the PDA's. The medication safety tool was never used because it proved to be too cumbersome and time consuming (Goldsworthy et al., 2006).

Support

Data collection involves the researcher measuring the areas of interest in the study. Measuring involves assigning numbers to the data. Numbers are then used to compare information. There are four levels of measurement. In the nominal level of measurement objects or events are categorized and distinct from each other. In the ordinal level of measurement data is rank ordered and placed into categories; however the differences cannot be specified. In the interval level of measurement data can be placed into categories and ranked and the distance between the ranks can be measured. In the ratio level of measurement data can be categorized

and ranked and the difference between the ranks can be measured and a zero point can be identified (Nieswiadomy, 2007).

To determine the level of measurement which should be used, the researcher must consider the precision of the data. If the precision of the data is imperative, interval or ratio level of measurement should be used. If ranked data will be sufficient, ordinal data can be used. If only categories of data are necessary, nominal data is sufficient (Nieswiadomy, 2007).

When collecting data, five questions are taken into account. These questions are what, how, who, where, and when. First the researcher needs to determine what data will be collected. Then they need to determine how the data will be collected. Next the researcher must decide who will collect the data. Then, where the data will be collected must be determined. Finally, the researcher must decide when the data will be collected (Nieswiadomy, 2007).

The data collection method must be determined by the researcher. Methods include self-report questionnaires, interviews, scales, or tests. After the data collection method is determined instruments or tools must be selected. The instrument can be an existing instrument or an instrument can be developed by the researcher. The instrument used must be practical, reliable, and valid (Nieswiadomy, 2007).

The reliability of an instrument is concerned with consistency and stability. The text discusses three different types of reliability. “The stability reliability of an instrument refers to its consistency over time” (Nieswiadomy, 2007, p. 218). Equivalence reliability addresses when two types of an instrument give the same results or when two observers obtain the same results with one instrument. Internal consistency reliability involves the extent to which all items within an instrument measure the same variable (Nieswiadomy, 2007).

The validity of an instrument is concerned with the instruments ability to “gather data that it is intended to gather (Nieswiadomy, 2007). The text discusses four categories of validity. Face validity is when the instrument appears to be measuring what it is supposed to measure. Content validity “is concerned with the scope or range of items used to measure the variable” (Nieswiadomy, 2007, p. 222). Criterion validity is concerned with the ability of the instrument to measure participant’s responses in the present time and predict responses in the future. Construct validity deals with the ability of the instrument to measure the concept that it is supposed to measure (Nieswiadomy, 2007).

There can be errors in data collection. These errors can be from the instruments used, environment variations, or the characteristics of the subjects. However, variations from the data are expected in the research process (Nieswiadomy, 2007).

Analysis

Information regarding the data collection methods in the article by Goldsworthy et al. (2006) is lacking in areas. The authors discuss the data they want to collect. The data they wanted to collect was the level of self-efficacy of nursing student’s pre and post PDA use and if the use of PDA’s increases the student’s preparedness to administer medications safely. The authors discussed how the data would be collected. Nieswiadomy (2007) states “some type of research instrument will be needed to gather data” (p. 214). The instruments Goldsworthy et al. (2006) utilized were a general self-efficacy test and a safety tool for medication administration. The article does not specifically say who collected the data. It appears the instructors assigned to the students administered the tests; however this is an inference that the reader has to make.

The article by Goldsworthy et al. (2006) never discusses where the data was collected. The participants filled out the tests, but did they fill them out in the clinical setting or elsewhere?

Nieswiadomy (2007) discusses the use of an optimum setting. If the setting is not convenient or conducive the answers may not be valid.

One of the instruments the authors used was an existing instrument. The general self-efficacy instrument was an existing instrument. However, the reliability and validity were not discussed in detail. “The types and degree of reliability should be reported” (Nieswiadomy, 2007, p.226). The other instrument used was developed by the authors. This instrument was the safety tool for medication administration. This tool was never utilized because the instructors found it too cumbersome and time consuming (Goldsworthy et al., 2006). Nieswiadomy (2007) states a pilot study should be conducted when developing a new instrument and this study should be separate from the original study. The authors never tested their instrument and it proved to be un-useful in their research.

The data from the article by Goldsworthy et al. (2006) appeared to be measured with a ratio level of measurement. According to Nieswiadomy (2007) ratio level of measurement is ranked and the difference can be measured and there may be a zero point. In the research study by Goldsworthy et al. (2006) tests were given pre and post PDA use. The difference between the two tests was measured. Some of the students did not have any difference and the number was recorded as zero. So there was an absence of the quantity being measured.

Instrument

Evidence

The Goldsworthy, Lawrence, & Goodman (2006) article contained two stated data collection methods. The General Self-Efficacy instrument consisted of ten items and all groups had a pre- and post-general self-efficacy instrument administered. The pretest was administered before the study started, and the posttest was administered eight weeks later (Goldsworthy et al.

pp.140). The second data collection method was developed by the authors of the experiment and was referred as the safety tool for medication administration (Goldsworthy et al. pp.140). The last data collection method was not given much recognition in the article, but was a reflective journal written by the student that utilized the PDA.

Support

Questionnaires, as well as demographic questions are used in the Goldsworthy, et al article. According to Nieswiadomy , questionnaires can be used to measure knowledge levels, opinions, attitudes, beliefs, ideas, feelings, and perceptions, as well as to gather factual information about the respondents (Nieswiadomy, pp.233). Demographic questions gather data on the characteristics of the sample, and include factors such as age, educational background, and religion (Nieswiadomy, pp.236).

Analysis

A pre-and post test was given to the students that measured self-efficacy. Self efficacy can be considered as one's beliefs in one's capabilities to organize and execute the sources of action required to manage prospective situation (Goldsworthy et al. pp.139). In other words, self efficacy using PDA's will reflect the student's ability to achieve success in the clinical setting. The pre and post testing should assist the researcher's ability to measure the student's success and positive learning experiences utilizing the PDA in clinical settings. Demographic questions were used in the pre- and post test even though it is not clearly stated what questions were asked. The reason they can be classified as demographic questions is because the data collected from the tests are data that is used to describe the study sample, and it examines the relationships

between these students' responses and other variables of interest in the study (Nieswiadomy, pp.236). The article lacks a supportive data collection methods because they did not state if interviews were done with the instructors or students regarding proper PDA use. There is also no evidence that research observations were done, even though it is implied because they are students under the care of an instructor.

Data Analysis Descriptive Statistics

Evidence

In the study by Goldsworthy et al. (2006) self-efficacy pretests were used. The mean pretest score for the combined PDA groups was 32.539. For the control group the mean score was 32.5000. For students who took both tests the mean score increased from 32.539 on the pretest to 36.308 on the posttest, for a mean difference of 3.77. For the non-PDA students the pretest mean was 32.500 and the posttest mean was 33.167, for a mean difference of 0.667 (Goldsworthy et al., 2006, pg. 141)

17 students were in the PDA group. 76% of the students reported using the PDA more than five times during their shift. Tables two and three in the article show the differences from pre and posttest scores for both the PDA group and the non PDA group. For all students who took both tests in the PDA group there is a positive difference. The students who took both the tests in the non-PDA group had either a positive or negative difference or no difference at all (Goldsworthy et al., 2006, pg. 141).

Support

Numerical characteristics of samples are referred to as statistics. “Descriptive statistics are statistics that organize and summarize numerical data gathered from samples”

(Nieswiadomy, 2007, p. 269). There are different ways to categorize descriptive statistics.

The first way is measures to condense data. These are statistics used to “summarize and condense data” (Nieswiadomy, 2007, p. 270). There are different ways to condense or summarize data. One method is frequency distribution. Frequency distribution refers to the number of times each value or score appears. Frequency distributions can be symmetrical (both halves are the same) or nonsymmetrical (skewed). If the tail goes to the right, there is a positive skew and to the left is considered a negative skew (Nieswiadomy, 2007).

“Data may be presented in a graphic form that makes frequency distribution of the data readily apparent” (Nieswiadomy, 2007, p. 274). Graphs can include a bar graph, a histogram, or a frequency polygon. These methods of displaying data assist the reader to analyze the data (Nieswiadomy, 2007).

“A Percentage is a statistic that represents the proportion of a subgroup to a total group, expressed as a percentage ranging from 0 to 100” (Nieswiadomy, 2007). A large enough sample is necessary to be representative of the population. If it is not large enough, the percentage will not be useful or a valid statistic (Nieswiadomy, 2007).

“Measures of central tendency are statistics that describe the average, typical, or most common value for a group of data” (Nieswiadomy, 2007, p. 276). The mode is the number which occurs most often in a set of data. If it is just one number, it is referred to as unimodal and if there are two values with high frequency it is referred to as bimodal and more than two is referred to as multimodal. However, the mode is rarely reported in the literature due to the fact it is only a crude estimate (Nieswiadomy, 2007).

The median in the “middle score or value in a group of data” (Nieswiadomy, 2007, p. 277). The mean is “the average sum of a set of values found by adding all values and dividing by the total number of values” (Nieswiadomy, 2007, p. 278). This measure of central tendency is also called the arithmetic mean (Nieswiadomy, 2007).

“Measures of variability describe how spread out the values are in a distribution of values” (Nieswiadomy, 2007, p. 278). The distance between the highest and lowest value is referred to as the range. Percentiles can be used to compare individual data with that of others. The standard deviation indicates the average variation of all values from the mean value. A z score allows for interpretation of a particular value in relation to other values in a distribution (Nieswiadomy, 2007).

“Measures of relationships concern the correlations between variables” (Nieswiadomy, 2007, p. 282). Correlation coefficients are two values which are compared and can have either a positive or negative relationship. Scatter plots or scattergrams are graphs which present the relationship between two variables. Contingency tables display “the relationship between sets of nominal data visually (Nieswiadomy, 2007, p. 286).

Analysis

The descriptive statistics utilized by the authors of the study are minimal, which makes the section weak. The mean of various items is discussed. The mean of both pretest and posttest scores within the PDA and non-PDA groups are addressed. According to Nieswiadomy (2006) “the mean is appropriate for interval and ratio data” (p. 278). It is considered the most stable measure of central tendency if distribution of the data is normal (Nieswiadomy, 2006).

The only other descriptive statistic the authors refer to is a percent. “Many (76%) used the PDA more than five times in their shift” (Goldsworthy et al., 2006, p. 141). However, the

authors never state the population this was extracted from. There were 17 students in the PDA group, but it is not mentioned if this percent was taken from that total number or not. According to Nieswiadomy (2007) “the minimum number for the computation of percentages should be at least 20” (p. 276). So, the authors of the article had a relatively small number, which may not have been representative.

The article by Goldsworthy et al. (2006) does have some tables, but no graphs or other visual displays. “Graphic displays have a visual appeal that may cause the reader to analyze the data more closely” (Nieswiadomy, 2007, p. 274). Also, no other descriptive statistics such as standard deviation, ranges, or percentiles are mentioned within the article.

Data Analysis Inferential Statistics

Evidence

The Goldsworthy, Lawrence, & Goodman (2006) article contained some inferential statistics. The most obvious statistic was the t test. The article used paired sample t tests for student results, and was compare to the mean increases in both studied groups (Goldsworthy et al. pp.141). There was no chi square test done , nor ANOVA test because there were only two groups studied.

Support

Inferential statistics use sample data to make decisions about a population, and are largely based on probability (Nieswiadomy, pp.295). The population is the group of interest when inferential statistics used. Due to the fact that inferential statistics are based off chance, the researcher wants to prove that chance is not the reason for the relationships found in research (Nieswiadomy, pp.295).

The t-test can be considered an inferential statistic. The t-test measures the difference between the means of the two groups studied of values (Nieswiadomy, pp.307). Interval/ratio data are required, and sample data should be selected by populations that have equal variances on the variable being measured (Nieswiadomy, pp.307). Therefore, the t test will not reflect biased results. This article uses an independent t test because there is no association between the scores of the groups that are being observed such as with an experimental group and a control group (Nieswiadomy, pp.307)

Analysis

As stated in the Goldsworthy, Lawrence, & Goodman (2006) article, there were 36 participants in the study. Of the 36 students there were four appointed groups; two groups that used the PDA's, and two groups that did not use the PDA's. Before the study began all 36 participants completed a pretest, the mean pretest scores were remarkably similar. The PDA group scored a mean of 32.539, the non-PDA group scored a mean of 32.500. However, the posttest scores quite difference as reflected by the t test. The mean post test for the PDA group improved to 36.308; or $p < .001$. The non PDA posttest group scored a mean of 33.167; or $p < .16$. The t test illustrates the difference in test scores quite easily using the coefficient p. $P < .001$ as compared to $p < .16$ is a significant difference between two groups. The article lacks supportive inferential statistical analysis. There is no documented z score, or confidence intervals noted.

Study Findings

Evidence

The Goldsworthy, Lawrence, & Goodman (2006) article discussed the study findings and provided many examples that supported the hypothesis. The students initiated an opportunity to replace the traditional use of drug cards as a reference for the pharmacology testing laboratory with the drug reference in the PDA (Goldsworthy, pp.142). Students also described the PDA's as a quick reference for the medications that the professor referred to during the course of the lecture (Goldsworthy, pp.142). Overall, the students were able to intuitively expand the use of the PDA's in the clinical setting to meet their unique learning needs. This, in turn, seems to have enhanced their perceptions of self-efficacy (Goldsworthy, pp.142).

Support

The discussion of the findings is a much more subjective section of a research report than the presentation of the findings, and therefore should make interpretations of the findings (Nieswiadomy, pp.323). The interpretation should include the strengths and weaknesses of their studies (Nieswiadomy, pp.324). The discussion of findings should also report study limitations. Most importantly, the findings of a study provide empirical support for the hypothesis (Nieswiadomy, pp.324).

Analysis

The hypothesis in the Goldsworthy, Lawrence, & Goodman (2006) article states "A student with a PDA equipped with the current necessary resources can dispense with heavy textbook, and other awkward resources and will instantly have access to the most current and applicable information for the care of the acute medical-surgical patient" (Goldsworthy et al.

pp.138). The discussion of the study findings in the article does support that hypothesis by example. It does not state the weaknesses of the study, but rather focuses on the students' success with the PDA. The language is subjective, and offers the experiences that the student had using the PDA for learning and clinical needs. The discussion of finds also supports the research questions which include: "Does the PDA influence the students' preparedness for the safe administration of medications? "Does the PDA enhance the students' self-efficacy (Nieswiadomy, pp.117)? The students described the PDA's as a quick reference for the medications that the professor referred to during the course of the lecture.....and were able to retrieve information related to both medications and procedures (Goldsworthy, pp.142). Lastly, the students were able to intuitively expand the use of the PDA's in the clinical setting to meet their unique learning needs, which in turn enhanced their perceptions of self-efficacy (Goldsworthy, pp.142)

Study Conclusions, Implications, & Recommendations

Evidence

"PDA's have the potential to increase self-efficacy among undergraduate nursing students and at a meta-level, the study shows that claims of this sort can be subjected to experimental testing" (Goldsworthy et al., 2006, pg. 142). One limitation of the study was a small sample size. Another limitation was the usability of the medication safety instrument (Goldsworthy et al., 2006, pg. 142). Recommendations for future research include using the PDA in a wider variety of settings such as "maternal child and community placement" (Goldsworthy et al., 2006, pg. 142).

Support

“The study conclusions are the researcher’s attempt to show what knowledge has been gained by the study and are also an attempt to generalize findings” (Nieswiadomy, 2007, pg. 326). The study conclusion should be written in general terms and be more abstract. However, the conclusion should not be over generalized (Nieswiadomy, 2007). Study conclusions should take into account the problem, purpose, hypothesis, theoretical framework, sample size, and the population from which the sample was drawn (Nieswiadomy, 2007).

Implications should be included for every conclusion of a study. “Implications may be addressed to any or all of the following: clinicians, educators, researchers, administrators or theorists” (Nieswiadomy, 2007, pg. 328). Implications include any suggested areas of change and include the “should” that resulted (Nieswiadomy, 2007, pg 332).

All research reports should contain recommendations for future research. Recommendations may also include a replication of the research study or a new study. Limitations of the study should be addressed. Limitations should be considered for future research (Nieswiadomy, 2007, pg. 328).

Analysis

The conclusion, implications, and recommendations section in the article by Goldsworthy et al. (2006) is very brief. The conclusion the authors draw shows the knowledge they gained regarding the use of PDA’s among undergraduate nursing students. The conclusion of the study goes beyond the findings of the study, which according to Nieswiadomy (2007) is the appropriate way to formulate a conclusion. Goldsworthy et al. (2006) attempts to generalize the results of PDA usage to other nursing students. According to Nieswiadomy (2007) the purpose of a study “is to be able to generalize results to broad populations” (pg. 326). The authors of the

study also use the phrase “have the potential” (Goldsworthy et al., 2006, pg. 142). According to Nieswiadomy (2007) conclusions are tentative and this is an acceptable phrase for a conclusion.

There are no implications within the study by Goldsworthy et al. (2006). Nieswiadomy (2007) says implications should always be included. This allows the authors to make suggested changes based on the conclusion of the study. The lack of implications, make this a weak portion of the research conducted by Goldsworthy et al. (2006)

Goldsworthy et al. (2006) do make a recommendation for future research. They suggest future research could be done in other clinical settings with the use of PDA's. This would be considered a partial replication study. According to Nieswiadomy (2007) these are similar studies only with a different size or setting. Goldsworthy et al. (2006) suggest a different setting.

The study limitations are addressed in the article by Goldsworthy et al. (2006). The limitations of the study were the medication safety instrument and the small sample size. According to Nieswiadomy (2007) these are often common limitations of studies.

Conclusion

A research critique involves a “through examination of all parts of the research study” (Nieswiadomy, 2007, pg. 378). Throughout this paper all the parts of the research study by Goldsworthy et al. (2006) were critically examined. There were both strengths and weaknesses in the article by Goldsworthy et al. (2006). There is a strong problem statement; however, the purpose of the article is not clear, making this section weak. The review of literature is very minimal, adding another weakness to the article. There is a clear theoretical framework which relates to the concepts of the article. The hypothesis of the article is not clearly stated. Overall, the research design of the study is strong. The article lacked information regarding the sample and sampling methods, making this another weak section of the research. Information regarding

the data collection methods and the instruments used is lacking in areas. There is minimal information given related to differential and inferential statistics. The final sections of the research study are very brief. No implications are provided by the authors. However, brief recommendations for future research are made.

It is important to remember that all research studies have strong and weak points (Nieswiadomy, 2007). Overall, this research study has more weaknesses than strengths. This could be due the fact that it is one of the first research studies regarding the topic of PDA's and nursing students. Further studies on this topic area would be necessary to help strength certain aspects of the research.

References

- Goldsworthy, S., Lawrence, N., & Goodman, W. (2006). The use of personal data assistants at the point of care in an undergraduate nursing program. *CIN: Computers, Informatics, Nursing*, 24(3), 138-143. Retrieved from <https://fsuvista.ferris.edu/webct/cobaltMainFrame.dowebct?appforward=/webct/viewMyWebCT.dowebct>
- Nieswiadomy, R.M. (2007). *Foundations of nursing research* (5th Ed.). Upper Saddle River, New Jersey: Prentice Hall.

Research Critique*Grading Criteria*

APA Format: up to 30 points or 30% can be removed after the paper is graded for Title page, abstract, headers Margins, spacing, and headings, reference page, title page, abstract Sentence structure, spelling, grammar & punctuation.

<u>Headings</u>	Possible Points	<u>Points Earned</u>	<u>Comments</u>
Abstract and Introduction: No heading for intro, but there should be a introduction of the study and what your paper will address, why you are doing the critique	10		
Purpose & Problem Statement (Identify the problem & purpose and analyze whether they are clear to the reader. Are there clear objectives & goals? Analyze whether you can determine feasibility and significance of the study)	10		
Review of the Literature and Theoretical Framework (Analyze relevance of the sources; Identify a theoretical or conceptual framework & appropriateness for study)	10		
Hypothesis(es) or Research Question(s) (Analyze whether clearly and concisely stated; discuss whether directional, null, or nondirectional hypothesis[es])	10		
Sample & Study Design (Describe sample & sampling method & appropriateness for study; analyze appropriateness of design; discuss how ethical issues addressed)	10		

Data Collection Methods & Instruments (Describe & analyze the appropriateness of the what, how, who, where and when; describe & analyze reliability and validity of instrument)	10		
Data Analysis (Describe descriptive & inferential statistics & analyze whether results are presented accurately & completely)	10		
Discussion of Findings (Analyze whether results are presented objectively & bound to the data, whether there is a comparison to previous studies and whether new literature is introduced that was not included in the Literature Review)	10		
Conclusions, Implications, & Recommendations (Analyze whether the conclusions are based on the data, whether hypotheses were supported or not supported, whether implications are a result of the findings, and recommendations consider limitations)	10		
Your paper should end with a brief conclusion of your critique	10		
PAPER POINTS	100		
Deductions for APA, grammar and Spelling			Final GRADE

