

Validity of Instruments, Appropriateness of Designs and Statistics in Articles in Nigerian Education Journals

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Abstract: *The main purpose of the study is to appraise the validity of research instruments, the appropriateness of the research designs and the statistics used for data analyses in articles published in education journals in Nigeria. Currently, higher institutions in Nigeria tend to prefer articles published in foreign/international journals. Some researchers in the country also question the validity of some of the articles published in local journals. Appropriate research designs, valid instrument and appropriate use of statistical tools are some of the indices that make research results credible and dependable. To assess these important variables, three questions were posed. Journal articles published in Nigeria education Journals for last five years were selected through accidental sampling technique. Then purposive sampling technique was used to select 132 empirical studies. Empirical studies were selected because they are the studies that lend themselves to use of designs, data collection with instruments and statistical analysis of data. Appraisal guides for instrument, design and statistics were used to assess the articles. The results showed that 67% of the articles were carried out with appropriate research designs, and in 78% of the articles, appropriate statistics were applied in data analyses. However, only 36% of the instruments used for the study would generate data that can lead to valid interpretation of the results. Programmes that will enhance knowledge and skills of researchers to improve the quality of research based publications are recommended. Institutions of higher learning can help their staff in this direction.*

Keywords: *Validity, Instrument, Research Design and Statistical Analysis.*

I. Introduction

The traditional key concepts in classical test theory, validity and reliability have remained central in judging the credibility of research works and results that accrue from the research endeavour. A valid measure is measuring what it is supposed to measure. In practical terms, it is the extent to which subjects' responses to the instrument actually correspond to the quality of behaviour in which one is directly interested. In a more current understanding, validity is the extent to which scores on a test enable one to make meaningful and appropriate interpretation (Ary, Jacob & Sorensen, 2012)

As contained in standard for educational and psychological tests by American Educational Research Association, American psychological Association and National Council on measurement in Education, validity is defined as the degree to which evidence and theory support the interpretations of test scores entailed by proposed uses of tests (Ary, Jacob & Sorenson, 2012).

The tasks of improving the validity and reliability of instruments and interpretation of the results have been handled by experts through the traditional techniques of factor analysis, multidimensional scaling and data clustering. The more recent techniques include structural equation modeling and path analysis. With the advancement in computer application, measurement experts have developed several models for the latent trait theory. In practice, the problem of validity and reliability of instruments still remains with every researcher. The extent to which a researcher uses instrument to obtain data that lend themselves to valid and reliable interpretations to that extent the results of the research is credible and dependable. These are also predicated on the use of appropriate research designs and good statistical tools among others.

Choosing appropriate research designs is essential in research activity. A good research design is a master plan for conducting research and a blueprint for measurement, collection and analysis of data. Through appropriate design a researcher can logically rule out the effect of an outcome of anything, other than that of the treatment provided (Fitz- Gribbon in Esomonu, 2013) Design ensures the validity and reliability of the research results.

The statistics conclusion validity otherwise referred to as the appropriate use of statistics to infer whether a relationship is a true cause-effect relationship or chance factors is equally vital. Any inappropriate use of statistics is a threat because it can lead to error in conclusion.

Observably, some scholars in Nigeria have in recent time questioned the quality of some research studies and publications made from them. The problem is not delimited to Nigeria. For instance, Ioannidis (2005) stated that researchers who conduct scientific studies are often motivated by external factors such as the desire to get published, advance their careers, receive funding, or seek certain results. In Nigeria the proliferation of journals to some extent was a response to “publish or perish” syndrome in institutions of higher learning. Some institutions tend to emphasize articles published in foreign journals during promotion. However, some scholars on the other hand feel that these articles in local journals are of good quality, but lack of empirical evidence to justify these feelings is a handicap. This study is set out to assess some of the essential components of research work. To this end the study was guided by the questions: to what extent are articles published in Nigeria education journals carried out with valid instruments, to what extent are research designs and statistics used in the articles appropriate?

II. Methodology

The study is a survey carried out in Nigeria. The journals included in the study were those published in the last five years. The journals were selected through accidental sampling technique and the articles reviewed were selected through purposive sampling technique. Only empirical studies were selected because they are the studies that lend themselves to design, data collection with instruments and statistical analysis of data.

Each article was reviewed with respect to the three variables of concern by three experts with a good background in education measurement and evaluation, and research. In reviewing the article indicators relating to the three variables were used. Indicators of valid instrument include focus command for constructs, application of test blueprint, instrument’s ability to collect relevant data, adequate content coverage and so on. Appraisal guide for design includes indication for randomization, manipulation and control in different experimental designs, use of appropriate sampling techniques in surveys, proper data generation in associations for correlations. Appropriate statistics will depend on the type of data to be analyzed e.g. ratio, interval; the number of groups or data sets involved in the study, whether numerical data are normally distributed, compliance with statistical assumptions, type of research questions and so on.

In reviewing the articles, an instrument, design or statistics are regarded as valid or appropriate if at least two out of the three experts categorized it as such.

III. Results

The total number of articles reviewed was 132.

Table1: Analysis of Articles with Respect to Availability of Instrument, Research Design and Statistical Methods.

| VARIABLES | AVAILABLE | NOT AVAILABLE | TOTAL |
|--------------------|-----------|---------------|-------|
| Instrument | 38(29%) | 94 (71%) | 132 |
| Clear Design | 87 (66%) | 45 (34%) | 132 |
| Statistical Method | 96 (73%) | 36 (27%) | 132 |

Table 2: Instrument

| Quality | Number | Percentage |
|--------------|-----------|------------|
| Valid | 14 | 36 |
| Not Valid | 24 | 64 |
| Total | 38 | 100 |

Table 3: Research Design

| Design | Number | Percentage |
|-----------------|-----------|------------|
| Appropriate | 58 | 67 |
| Not Appropriate | 29 | 33 |
| Total | 87 | 100 |

Table 4: Statistical Method

| Statistics | Number | Percentage |
|-----------------|-----------|------------|
| Appropriate | 75 | 78 |
| Not Appropriate | 21 | 22 |
| Total | 96 | 100 |

IV. Discussion

Only 38 which in 29% of 132 articles reviewed had the instrument for data collection available, 14 (36%) of these instruments were considered valid while 24 (64%) were not valid. Availability of only few (29%) of the instruments used for data collections for the articles reviewed is a limitation to the work. However, the finding that only 36% of the available instruments are valid is an indication of the level of carelessness of researchers. This is also an indication that many researchers are no longer ready to subject themselves to the rigor of research work. When a research instrument does not yield data that can lend to valid interpretation of results, that research findings cannot be trustworthy. Ioannidis (2005) in his article 'why most published findings are false' declared that much of what biomedical researchers conclude in published studies are misleading, exaggerated and often flat out wrong. He charged that as much as 90% of the published medical information that doctors rely on is flawed. If one of the important functions of educational research is to identify the best practices to improve educational environment (Gal, Gall & Borg, 2003), then research should be seen as a serious business.

Out of 132 articles reviewed 87 had research design clearly stated out of which 67% were appropriate. This result showed that a good number of articles used appropriate research design. In 96 out of 132 articles reviewed the statistics used were clearly understood. 78% of this statistical tools used were appropriate. This result also showed that a good percentage of articles used appropriate statistical tools to analysis their data.

V. Conclusion and Recommendations

From the findings one can conclude that in many of the articles reviewed the researchers used appropriate research designs and apply appropriate statistical methods. However, it does appear that many of the researchers did not validate their instruments properly before use. It is important to note that educational research must meet certain standards otherwise the suggestions from its findings will be ineffective or possibly impair the learning process (Korb, 2010). Hence according to Esomonu, (2005), every invalid instrument yields unreliable data and any decision made based on the data is decision made on false information and this may have a far resolving implications on the education system and the society at large.

It is recommended therefore that instrumentation, with emphasis as validity and reliability should be given special attention in research studies.

There should be training and retraining of researchers and lecturers in higher institution to improve their research knowledge and skills. Institutions of higher learning in Nigeria should develop special programme for their lecturers in research capacity building Sponsorship to conferences, seminar and workshops are needed to expose researchers and lecturers to practical sessions.

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