EVALUATION OF ARGUMENTS IN RESEARCH REPORTS

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ABSTRACT

Some authors on research methodology are of the opinion that research reports are based on the logic of reasoning and that such reports communicate with the reader by advancing logical, coherent arguments (Bvhme, 1975:206; Mouton, 1996:69). This view implies that researchers draw certain conclusions and that such conclusions be justified by means of reasoning (Doppelt, 1988:105; Giere, 1984:26; Harre, 1965:11; Lehrer & Wagner, 1981:3; Pitt, 1988:7). The structure of research reports, therefore, consists mainly of conclusions and the reasons for such conclusions (Booth, Colomb & Williams, 1995:97). From this, it becomes clear that justification by means of reasoning constitutes a standard procedure in research and research reports.

Despite the fact that the logic of research is based on reasoning, that the justification of research findings by means of reasoning appears to be a standard procedure and that the structure of research reports consists of arguments, the evaluation or assessment of research, as described in most textbooks on research methodology (Burns & Grove, 1993:647; Creswell, 1994:193; LoBiondo-Wood & Haber, 1994:441/481), does not focus on the arguments used in research. The criteria for evaluation set out in these textbooks, however, have relevance to the manner in which the research process was executed and focus on the measures taken to ensure internal, external, theoretical, measurement and inferential validity.

This means that the criteria for the evaluation of research reports are comprehensive and that these criteria must be very specific for each type of research (for example, qualitative or quantitative research). Should the evaluation of research reports focus on arguments and logic, one universal set of standards against which to assess all types of human-science research reports could possibly be accepted. Such universal set of standards could possibly simplify and facilitate the evaluation of research reports in the human sciences by virtue of the fact that such standards could be used to assess all the critical aspects of research reports.

As arguments form the basic structure of research reports and are probably also important in the evaluation of research reports in the human sciences, the following questions are relevant to this paper, namely:

- *What are the standards that the reasoning in research reports in the human sciences should meet?*
- *How can research reports in the human sciences be evaluated according to these standards?*

In answering the first question, the logical demands that are made on reasoning in research are investigated. From these demands the acceptability of the statements, relevance and support of the premises to the conclusion are set as standards for reasoning in research.

In answering the second question, a research article is used to demonstrate how the macro- and micro-arguments of research reports can be evaluated according to these standards.

OPSOMMING

Sommige skrywers oor navorsingsmetodologie is van mening dat navorsingsverslae op die logika van argumentasie berus en dat sodanige verslae met die leser kommunikeer deur logiese, samehangende argumente aan te voer (Bvhme, 1975:206; Mouton, 1996:69). Hierdie beskouing impliseer dat navorsers bepaalde gevolgtrekkings aflei en dat sodanige gevolgtrekkings by wyse van argumentasie gestaaf word (Doppelt, 1988:105; Giere, 1984:26; Harre, 1965:11; Lehrer & Wagner, 1981:3; Pitt, 1988:7). Die struktuur van navorsingsverslae bestaan dus hoofsaaklik uit gevolgtrekkings en redes vir sodanige gevolgtrekkings (Booth, Colomb & Williams, 1995:97). Hieruit blyk dat stawing by wyse van argumentasie 'n standaardprosedure in navorsing en navorsingsverslae is.

Ten spyte daarvan dat die logika van navorsing op argumentasie berus, dat die stawing van navorsingsuitsprake by wyse van argumentasie 'n standaardprosedure blyk te wees en dat die struktuur van navorsingsverslae uit argumente bestaan, fokus die evaluering of beoordeling van navorsing, soos in die meeste navorsingsmetodologie-handboeke beskryf (Burns & Grove, 1993:647; Creswell, 1994:193; LoBiondo-Wood & Haber, 1994:441/481), nie op die argumente van navorsing nie. Die evaluerings-kriteria vir navorsingsverslae, wat in hierdie handboeke gestel is, hou egter verband met die wyse waarop die navorsingsproses uitgevoer is en fokus op die maatreëls wat getref is om interne, eksterne, teoretiese, metings- en inferensiële geldigheid te verseker.

Dit bring mee dat kriteria vir die evaluering van navorsingsverslae omvangryk is en baie spesifiek ten opsigte van elke tipe navorsing (byvoorbeeld kwantitatief of kwalitatief) moet wees. Indien die evaluering van navorsingsverslae op argumente en logika sou fokus, sou daar waarskynlik een universele stel standaard gestel kon word waarteen alle tipes menswetenskaplike navorsingsverslae beoordeel kon word. Só 'n universele stel standaard sou waarskynlik die evaluering van navorsingsverslae in die menswetenskappe kon vereenvoudig en vergemaklik deurdat sodanige standaard gebruik sou kon word om al die kritiese aspekte van navorsingsverslae te beoordeel.

Aangesien argumente die basiese struktuur van navorsingsverslae verteenwoordig en waarskynlik ook by die evaluering van navorsingsverslae in die menswetenskappe belangrik is, wil die outeur die volgende vraag beantwoord wat met die onderhawige artikel verband hou:

- *Wat is die standaard waaraan die argumentasie in navorsingsverslae in die menswetenskappe behoort te voldoen?*
- *Hoe kan navorsingsverslae aan die hand van hierdie standaard geëvalueer word?*

Om die eerste vraag te beantwoord, word die logika-eise ondersoek wat in navorsing aan argumentasie gestel word. Gebaseer op hierdie eise sal die aanvaarbaarheid van die stellings en die relevansie en ondersteuning van die premisse ten opsigte van die konklusie as standaard vir argumentasie in navorsing gestel word.

Om die tweede vraag te beantwoord word 'n navaorsingsartikel gebruik om te demonstreer hoe die mikro- en makro argumente van navorsingsverslae aan die hand van hierdie standaard geëvalueer word.

INTRODUCTION AND PROBLEM STATEMENT

Some authors on research methodology are of the opinion that research reports are based on the logic of reasoning and that such reports communicate with the reader by advancing logical, coherent arguments (Böhme, 1975:206; Mouton, 1996:69).

This view implies that researchers draw certain conclusions and that such conclusions be justified by means of reasoning (Doppelt, 1988:105; Giere, 1984:26; Harre, 1965:11; Lehrer & Wagner, 1981:3; Pitt, 1988:7). The structure of research reports, therefore, consists mainly of conclusions and the reasons for such conclusions (Booth, Colomb & Williams, 1995:97). From this, it becomes clear that justification by means of reasoning constitutes a standard procedure in research and research reports. Various theoretical perspectives on research support this view.

Rossouw (1993:96) describes scientific findings as "findings that, in principle, can stake a claim for the greatest possible measure of intersubjective consensus"¹. Research should be executed in such a way that its findings would be on a par with and stand the critical testing of other experts in the same domain. This, in turn, implies that research reports should be aimed at a specific research community and that the researcher should advance arguments to convince this research community of the validity of the conclusion of the research.

Despite the fact that the logic of research is based on reasoning, that the justification of research findings by means of reasoning appears to be a standard procedure and that the structure of research reports consists of arguments, the evaluation of research, as described in

most textbooks on research methodology (Burns & Grove, 1993:647; Creswell, 1994:193; LoBiondo-Wood & Haber, 1994:441/481), does not focus on the arguments used in research.

This means that the criteria for the evaluation of research reports are comprehensive and that these criteria must be very specific for each type of research (for example, qualitative or quantitative research). Should the evaluation of research reports focus on arguments and logic, one universal set of standards against which to evaluate all types of human-science research reports could possibly be accepted.

As arguments form the basic structure of research reports and are probably also important in the evaluation of research reports in the human sciences, the following questions are relevant to this paper, namely:

- What are the standards that the reasoning in research reports in the human sciences should comply with?
- How can research reports in the human sciences be evaluated according to these standards?

In answering the first question, the logical demands that are made on reasoning in research are investigated. From these demands the standards for reasoning in research are formulated.

In answering the second question, a research article is used to demonstrate how the macro- and micro-arguments of research reports can be evaluated according to these standards.

BACKGROUND

In order to describe the standards for the evaluation of research reports and the explanation of how these standards could be applied in evaluating research reports, it would be necessary first to define the concepts macro-argument and micro-argument.

The components of the macro-argument constitute the research decisions taken, with the research problem being the first component of the research report. The principal aim of research is to find a solution to the research problem. For this reason, the research purpose and objectives take their place as the second component of the research report. The research problem determines the nature of evidence required (Mouton, 1996:72; Van Veuren, 1996:13). Evidence is, therefore, gathered that could best solve the research problem. Evidence is furnished in the form of empirical and theoretical statements arising from the conceptualisation and operationalisation of research. As a result, conceptualisation and operationalisation are also listed as components of research. Conceptualisation refers to the defining of the key concepts of the research, as well as to the integration of the research findings into the greater conceptual framework or body of accepted knowledge. Operationalisation, on the other hand, refers to linking the key concepts to the actual phenomenon to be studied. In addition, it implies methods of data collection, data analysis, data interpretation and the choice of the population and sampling as well as measurements for validity and reliability. The conclusions arrived at by the researcher are based on the evidence collected, with the result that the conclusions constitute the last component of research.

Except for the so-called macro-argument that refers to the logical coherence between the components of research, so-called "micro-arguments" are also advanced within each component in support of the macro-argument. The motivation of the research problem really is a micro-argument within the component "problems statement" of the macro-argument. The research report, therefore, comprises multiple arguments of what are typified as the macro- and micro-arguments of research in the present paper.

STANDARDS FOR THE EVALUATION OF ARGUMENTS IN RESEARCH REPORTS

In order to be able to evaluate these macro- and micro-arguments in research reports, it is necessary to set standards to which the reasoning in research must comply. The logic, to which research reports must comply, is the logic of reasoning. For this reason, it is necessary to investigate the demands of logic made on reasoning in research in order to lay down standards for the evaluation of research reports.

Govier (1991:68) and Van Veuren (1991:34) elect the

following as requirements for solid reasoning:

- The acceptability of the statements.
- The relevance of the statements to the conclusion.
- Adequate support for the conclusion.

The above requirements for solid reasoning were used as a springboard for investigating and laying down the standards for reasoning in research reports. Following, each of the said three requirements for solid reasoning were investigated from a perspective of logic and contextualised within the research process. From this investigation the following three standards for the evaluation of argument in research reports were described, namely:

The acceptability of the premises and statements

It becomes clear from the investigation that the first standard the statements in a research report must comply with is that of acceptability. The acceptability of statements means that the reader could, on rational grounds, deem such statements to be true. For this reason, there must be a reason why the statements could be deemed acceptable. The reasons that have weight in research involve the researchers ability to confirm that a statement has been observed empirically and that it is in line with existing theoretical frameworks. The researchers, therefore, make especially empirical and theoretical statements in a bid to convince their readers of the acceptability of their statements.

The relevance of the statements to the conclusion

The second standard to be met by arguments in research can be formulated as follows: The premises in arguments in research ought to have relevance to the conclusion. Micro-arguments especially those based on empirical data and existing theoretical frameworks, ought to show the relevance of the premises to the conclusion.

Adequate support for the conclusion

A third standard to be met by the arguments in research reports is that the premises must lend adequate support to the conclusion and that the conclusion must, in turn, be qualified.

THE EVALUATION OF A RESEARCH ARTICLE ACCORDING TO THESE STANDARDS

To answer the second question of the paper the following research article will be used to demonstrate how the standards can be applied to evaluate the arguments in research reports.

McGOVERN, M & VALIGA, TM 1997: Promoting the cognitive development of freshman nursing students.

To evaluate the research article according to these standards it becomes necessary to reconstruct the article by doing an analysis and synthesis. Within the context of this paper, analysis and synthesis mean that one should identify and reconstruct the macro- and micro-arguments of the research report. The standards can then be applied to evaluate the macro- and micro-arguments of the research report.

EVALUATION OF THE MACRO-ARGUMENT OF THE RESEARCH ARTICLE

The evaluation of the macro-argument of the research article will focus on the logical coherence of the components. Therefore the second and third standards are employed to evaluate the macro-argument of research. As a result of reconstruction the macro-argument of the article can be described as follows.

Research problem and research questions

The problem statement is reflected in the first and third paragraph under the heading "background" and reads as follows:

The goals of the baccalaureate nursing education and the National League for Nursing (NLN) accreditation criteria for baccalaureate programs call for increasing emphasis on cognitive development, which refers to the way in which individuals reason, view knowledge, manage diversity of opinion and conflicting points of view, and relate to authorities or experts. Students who demonstrate growth are able to employ independent decision-making, provide nursing care despite conflicting and ambiguous information, engage in critical thinking and appreciate that a particular decision may be right for some, but not for others.

Despite the nature of nursing practice, which requires critical and independent thinking, studies related to the cognitive development of baccalaureate nursing students have revealed that the majority tend to be at the lower end of cognitive development, even upon graduation (Frisch, 1987; Keenan, 1988). However, advanced levels of cognitive development are necessary before one can think in more complex ways and engage in critical, independent thinking and moral reasoning (Anderson, 1989; Bandman & Bandman, 1991; Erwin, 1983; Franklin, 1985). Thus a systematic approach in developing students thinking skills has relevance for nurse educators.

Purpose and objectives

The objectives of the study are described in the second paragraph under the heading background and read as

follows:

1. *To describe the cognitive development of baccalaureate nursing students at the beginning and end of the freshman year.*
2. *To describe the change in cognitive development that occurs from the beginning and end of the freshman year.*

The authors state that the study was also designed

3. *to determine the effect of developmental instruction strategies on the cognitive development scores of freshman nursing students and*
4. *to investigate the relationship between cognitive development scores, grade point average (GPA) and SAT (Standard Ability Test).*

Only the third objective is relevant and supportive to the problem statement. The first and second objectives are already implied by the third objective. It will be part of a research design to determine the effect of developmental instruction strategies on the cognitive development scores of freshman nursing students and should therefore be part of the design description.

The fourth objective is not relevant nor, does it support the problem statement. It can therefore be omitted from this research article. If the authors want to remain with this objective, the problem statement should be adapted by adding arguments with regards to grade point average and abilities.

From the before mentioned evaluation one should recommend a change in the objectives to read as follows, in order to be logical-coherent to the current problem statement:

The purpose/objective of the study is to determine the effect of developmental instruction strategies on the cognitive development scores of freshman nursing students.

Conceptualisation

The conceptualisation of the article is described by the heading theoretical framework and literature review and can be summarised as follows:

The perspectives of Perry (1970) on intellectual (cognitive) and ethical development were used as theoretical framework. The scheme of Perry (1970) is organised into four major categories, namely dualism, multiplicity, relativism and commitment. Each category is described more thoroughly through a total of nine specific positions.

Dualism represents the lower two points on the nine point scheme. Points three and four are represented by multiplicity. Relativism represents points five and six and commitment is on levels seven, eight and nine.

Results of previous research based on Perry's perspectives are described.

From the perspectives of different authors, the study departs from viewpoint that specifically designed teaching strategies can encourage higher levels of thinking and problem-solving skills. Cognitive development occurs when individuals are confronted with diversity, multiple context and experiences that are incompatible with their existing cognitive structures.

The concept developmental instruction is based on the work of Knefelkamp (1974, 1981).

The only logical problem in the conceptualisation, as macro-argument in this article, is the concept "ethical development" as part of Perry's perspective. The authors only address cognitive development in the problem statement and objectives of the study. With Perry's scheme and the Learning Context Questionnaire (LCQ) cognitive and ethical development were measured that are not relevant and supportive to the other components of the study.

The use of Perry's scheme is a major threat to the logical coherence of this study. To overcome this problem it could be suggested to add ethical development to cognitive development in all components of the macro-argument.

Operationalisation

The operationalisation is discussed under the headings "methodology and data analysis" and consists of research design, population and sampling, data-collection, data analysis as well as validity and reliability.

Research design

Both descriptive and quasi-experimental designs were employed using a non-equivalent control group.

A quasi-experimental design is relevant and will support the suggested revised problem statement and objective of the study.

The descriptive design is however not relevant to any component of the study. No descriptive data was given as part of the results of this research.

From the before mentioned evaluation it could be suggested to delete the descriptive design in this study.

Population and sampling

A convenience sample of intact classes, scheduled by the university registrar, was used. One section received the experimental treatment (developmental instruction

strategies) and the four other groups of equal size received traditional teaching approaches.

The sample was generally white, female, Catholic, 18-20 years of age and from middle to upper class from New England and Atlantic regions.

Apart from the limitations of the non-equivalent control group the population and sample are relevant to and support the other components of the macro-argument of this research.

Data-collection

The LCQ was completed during class time. The instrument measured the stage of intellectual and ethical development and consisted of a 50-item likert-type scale which asked respondents to express the extent to which they agree or disagree with statements about learning, learning environment, grading and roles of teachers and students.

The four control groups were taught by another faculty member using traditional lecture-orientated teaching strategies. The experimental group was taught by the researchers using specific strategies to facilitate cognitive development. Both groups used the same syllabus, course objectives, topical outline and textbook.

Students completed the LCQ at the end of each semester. There was an interval of four months between the pre- and post-test.

Scoring of the LCQ results in a Perry score between 1 and 9.

The development instruction was organised around the concepts of challenge and support (Sanford, 1967). It was the task of the teacher to provide the appropriate balance of challenge or support to promote growth.

A one minute paper was adapted from Gross (1981) to assess the students understanding, misunderstanding, processing and integration of material. Extensive personal feedback was provided.

Apart from the logical problem already mentioned, data collection by the LCQ is relevant and supported by the previous components of the research article.

The one minute paper adapted by Gross (1981), however, is not relevant to the research problem or objective of this research and should be omitted. It will be relevant to a research objective to investigate students experience of developmental instruction strategies.

Data-analysis

A one-way analysis of variance and t-test compared the LCQ scores of the experimental and control groups after each testing period. Correlation analysis was done to describe the relationships between LCQ-scores and GPA and SAT.

In line with the suggested changes the correlation analysis can be deleted from this article.

Findings

The analysis of the September, May and December scores demonstrated no significant differences between the groups. The mean cognitive development for all freshmen nursing students of each of the three testings was 3.4, 3.66 and 3.61. This represents multiplicity according to Perrys score. Some growth was evident but the score remained on a lower level. The following table reflects the score.

The correlation analysis demonstrated

- a significant relationship between SAT-Math and GPA ($r=0,31$; $p 0,05$)
- a significant relationship between SAT-Verbal and LCQ ($r=0,27$; $p 0,05$)

Table 1 Mean LCQ score for each testing period

Group	N	Mean	SD
September			
Control	52	3.41	.7116
Experimental	14	3.56	.7949
December			
Control	45	3.59	.7699
Experimental	14	3.98	.8969
May			
Control	54	3.60	.7628
Experimental	17	3.65	.7144

- a significant inverse relationship between the initial LCQ scores and the rate of change in the LCQ scores ($r= - 0,52$; $p 0,001$)

Qualitative descriptive findings are reflected under the heading "discussion and implications."

In order to be relevant and to support the previous components the correlation data should be omitted from this research article.

Conclusions and implication

From the quasi-experimental design it was concluded that no significant differences between the

experimental and control groups were found.

Many conclusions were made from the qualitative descriptive data.

The limitations of the study were acknowledged

In order to be relevant and to support the other components, the discussion and implication should only focus on the effect of the programme. The conclusions made on qualitative data are not relevant to and do not support the other components of the research article.

EVALUATION OF MICRO-ARGUMENTS IN RESEARCH REPORTS

All three standards will be employed to evaluate the micro-arguments. I will present only one example of a micro-argument from this research article.

Example 1

Conclusion: Students involved in the development instruction were better prepared and more actively involved than previous students. Evidence/Premises: Qualitative differences in the One-Minute-Paper test were noted.

No descriptive data was reported under "findings" of this article. The conclusion is not supported by the evidence because of a lack of acceptability and relevance due to insufficient evidence.

Similar fallacies in reasoning are the pattern under the heading "discussion and implications".

CONCLUSION

Keep in mind that this article was peer reviewed and accepted by the research community. By using these standards to evaluate the arguments in research reports, recommendations could have been given to improve the quality even more.

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