# Quality of the academic research of a postgraduate degree in surgery from a public university in Ecuador

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## Abstract

*Introduction:* The lack of solidity of educational research (ER) in a high percentage and the loss of integrity in the methodology have been reported. The objective of the present study was to determine the quality of the ERs of postgraduate surgery at a public university in Ecuador. We hypothesize that the acceptable theses are equal to 70%.

*Methods:* The present study reviewed the thesis of surgery at the University of Cuenca from January 2010 to November 2019. The probabilistic sample selection was 48 cases. A 51-question EI quality test was used. The values of each variable were homologated as a percentage. A single sample T-test was performed, and bivariate correlations were determined using the Spearman coefficient. Significant values were $R > 0.5$ and $P < 0.01$. The hypothesis test was performed with Chi square.

*Results:* Of 48 randomized theses, the lowest average was in the "Hypothesis" sections (41.6% [35.3-47.8]), and the highest was in the "Results" sections (93.5% [91.4-95.7]). The relevance was 97.9% (93.7-102.1). 35 theses (72.9%) were rated as "Acceptable". The Hypothesis and References sections were rated as "Not acceptable" in 70.8% and 79.2%, respectively. The "results" section obtained the rating of "Excellent" in 93.8%. The hypothesis was accepted, and the group had an acceptable quality equal to 70%", Chi2 = 0.2208, P = 0.64.

*Conclusion:* The quality of educational research is equal to the 70% raised in the hypothesis, which highlights a minimum sufficiency rating for the educational research studied in this work.

**Keywords:** Educational Research, Research Sections, Research Quality, Master's Thesis.

## Introduction

The lack of solidity of regular academic research or educational research (EI) is a relevant issue that has been studied in Latin America. In a report in Peru of 47 Master's theses in Public Health and 172 undergraduate theses, 66% and 79.9% were unacceptable due to loss of integrity of their methodology [1, 2]; this problem is similar in the nursing area [3, 4]. There is always someone responsible for the quality of the EI; this person should have the ability to make an editorial cut even prior to the start of the research in the protocol conformation phase [5, 6]. With this methodology, it would be possible to achieve acceptability and excellent results of up to 72.4% and 6.4% [7, 8].

Educational research constitutes a graduation requirement in postgraduate medicine, and quality errors could be attributed to a low-quality methodological design, the lack of feasibility of the research, the low interest in the topic, the lack of relevance of the research idea and a possible ethical weakness of the study. The first factor is explained by the type of study used. Descriptive studies are easier to carry out than comparative studies, so the former are the most chosen. To mitigate this fact, the university regulations of some committees have suggested that comparative groups be preferred for the presentation of protocols and that they have the approval of a specialist research advisor. Another important point is the type of variable studied, since some produce "hard data" that include specific measurements such as serum protein levels and gene expression, while "soft data" measurements report subjective questionnaires such as quality of life or health tests.

The feasibility of a study should consider whether there will be a sufficient number of cases to saturate the sample calculation, whether there are financial and human resources for the research and whether it is feasible to carry out special tests (genomic, chemical) that comply with the main purpose of an investigation, which is the generation of knowledge. If it is stated that a study has a weakness due to the loss of its feasibility, it is generally not approved by a committee; however, when doing

so, the studies generally do not culminate and constitute a group of truncated investigations that abound at the university level.

The confusion between uncertainty and research can mean that a research idea is not clear enough. Researchers are generally postgraduate, and every time they treat a patient, even with a known therapy, an element of uncertainty arises. For this reason, doctors sometimes point out that all treatment amounts to an experiment and that the element of experimentation becomes even more pronounced when, as is often the case, routine regimens vary slightly, trying to achieve better results than those produced with a standard approach. Describing such therapeutic interventions - whether it is a slight deviation from a standard treatment or a major innovation - does not violate common usage, although, for various reasons, these interventions should not be confused with what is research.

Knowledge is new when it generates a concept that the scientific community recognizes as such, although research can brilliantly provide semi-new knowledge with a concept from another area applied to medicine, redundant studies abound in medicine with the criterion that these epidemiological data do not exist in our area, this is what determines the lack of relevance of a study and the subsequent deterioration of the results of a "local" study with a non-significant number of patients.

A poorly designed study is not robust. One of the most controversial aspects refers to whether the research ethics committees (IECs) should evaluate the scientific suitability of the protocols they review. RECs usually have this responsibility, but their way of carrying out this task is often the subject of harsh criticism. Exposing study participants to physical or social harm, discomfort, or even inconvenience can only be justified when there is good reason to anticipate some compensatory benefit to society - that is, to the body of scientific knowledge or the well-being of future patients or of society in general - and perhaps also for the participants. Therefore, a study should never be undertaken whose design presents such a number of problems that it will hardly leave any teaching [9]. (Figure 1). An investigation without solidity can report paradoxical results, which will hardly be publishable. If it is known that the measurement of the research activity of a university center is given by the number of articles published in high-impact journals, this will affect the postgraduate score, the institution and the administrative level in the allocation of funds for publication (Figure 1).
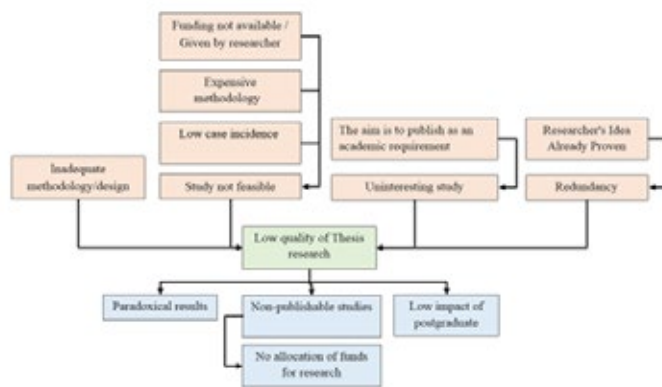


**Figure 1:** Problem tree of the low quality of educational research

The objective of the present study was to determine the quality of regular educational investigations of postgraduate surgery at the Public University of Ecuador, with the hypothesis that more than 70% of educational investigations have a good degree of acceptability.

## Materials and Methods

For this study, a review of the theses published in the electronic repository of specialty theses of the Postgraduate in Surgery at the University of Cuenca was carried out during the period from January 2010 to November 2019. The selection of the sample was probabilistic based on or reference to a universe of 60 published theses. The sample calculation corresponded to 48 randomized cases that fulfilled the complete data for the analysis using the formula $n=(Z_a^2 \, 2*p*q)/d^2$, heterogenicity 9%, margin of error 5%, and 95% confidence level. A 51-question test was used to rate the quality of educational research, used in a previous study published by a collaborating group [10]. The variables were grouped into sections of the article, giving a score of 8 for the title and abstract, 12 for the statement of the problem, 10 for the theoretical framework, 18 points for the hypothesis and definition of variables, 30 points for the study methodology, 18 points for results, discussion, conclusions and recommendations, 4 points for bibliographic references, and 20 points for relevance of the study. The author was the reader of the theses, and full access to each study was obtained. We proceeded to fill in the data of each investigation in an electronic sheet. The statistical analysis software was SPSS 21.0. The variables are reported as frequencies and percentages. The values of each variable were homologated with their unique maximum value to obtain the percentage value. A single sample T test was performed between the averages of the homologous variables. As a secondary analysis, the correlation between the variables was proposed using the Spearman coefficient, and significant values are reported with R> 0.5 and P <0.01. The hypothesis test was performed with Chi square.

## Results

Forty-eight research projects were analyzed with their final report published in the institutional repository of the University of Cuenca, which corresponded to theses of postgraduate students prior to obtaining the title of Specialist in Surgery. Most of the topics covered are general surgery topics: bile duct, digestive, and surgical management of hernias. The quality scores for each variable are described in Table 1.

**Table 1: Description of the quality of the academic research sections**

| | | T&AR (8 p) | RP (12p) | TF (10p) | H&V (18p) | MET (30p) | RDC (18p) | REF (4p) | REL (20p) | QOM |
|---|---|---|---|---|---|---|---|---|---|---|
| Valid Cases | | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 |
| Average | | 5,5 | 9,5 | 7,3 | 7,5 | 22,3 | 16,8 | 2,1 | 19,6 | 71,1 |
| Std.Error (mean) | | 0,2 | 0,3 | 0,3 | 0,6 | 0,4 | 0,2 | 0,1 | 0,4 | 1,1 |
| Median | | 5,0 | 10,0 | 7,0 | 8,0 | 22,0 | 17,0 | 2,0 | 20,0 | 71,5 |
| Mode | | 5,0 | 10,0 | 7,0 | 1,0a | 20,0 | 18,0 | 2,0 | 20,0 | 63,0a |
| Std. Deviation | | 1,2 | 1,9 | 1,9 | 3,9 | 3,0 | 1,3 | 0,8 | 2,9 | 7,4 |
| Variance | | 1,3 | 3,6 | 3,4 | 15,1 | 8,8 | 1,8 | 0,7 | 8,3 | 55,0 |
| Range | | 5,0 | 7,0 | 8,0 | 12,0 | 13,0 | 5,0 | 3,00 | 20,0 | 30,0 |
| Minimum | | 3,0 | 5,0 | 2,0 | 1,0 | 17,0 | 13,0 | 1,0 | 0,0 | 56,0 |
| Maximun | | 8,0 | 12,0 | 10,0 | 13,0 | 30,0 | 18,0 | 4,0 | 20,0 | 86,0 |
| Percentiles | 25 | 5,0 | 8,0 | 7,0 | 3,5 | 20,0 | 16,0 | 2,0 | 20,0 | 64,3 |
| | 50 | 5,0 | 10,0 | 7,0 | 8,0 | 22,0 | 17,0 | 2,0 | 20,0 | 71,5 |
| | 75 | 6,0 | 11,0 | 9,0 | 11,0 | 24,3 | 18,0 | 2,0 | 20,0 | 76,8 |

a. There are multiple modes. The smallest value is displayed. T&A: Title and abstract. RP: Research problem. TF: theoretical framework. Hy&V: Hypothesis and Variables. MET: Methods. RDC: Results, Discussion, Conclusions. REF: References. REL: Relevance of the investigation. QOM: Quality of methodology.

The values were homologated with their unique maximum value to obtain the percentage value (Table 2). There was a significant difference in the sample (T test), and each average was significantly different between them. The lowest averages were attributed to the hypothesis section (41.6% [35.3-47.8]), and the highest corresponded to the results section (93.5% [91.4-95.7]).

**Table 2: Test of a sample of the homologous values (percentages) of the study variables**

| | Test value = 0 | | | | 95% Confidence interval of the difference | |
|---|---|---|---|---|---|---|
| | t | df | P | Mean difference | Lower | Upper |
| Title (%) | 33,2 | 47 | <0,0001 | 68,75 | 64,58 | 72,92 |
| Research problem (%) | 34,7 | 47 | <0,0001 | 79,34 | 74,74 | 83,94 |
| Theoretical framework (%) | 27,1 | 47 | <0,0001 | 72,50 | 67,13 | 77,87 |
| Hypothesis (%) | 13,4 | 47 | <0,0001 | 41,55 | 35,29 | 47,81 |
| Methods (%) | 52,2 | 47 | <0,0001 | 74,44 | 71,58 | 77,31 |
| Results (%) | 86,9 | 47 | <0,0001 | 93,52 | 91,35 | 95,68 |
| References (%) | 18,0 | 47 | <0,0001 | 53,65 | 47,66 | 59,63 |
| Relevance (%) | 47,0 | 47 | <0,0001 | 97,92 | 93,73 | 102,12 |
| Total (%) | 76,3 | 47 | <0,0001 | 75,52 | 73,55 | 77,53 |

The relevance section due to its binominal characteristic (0 or 20) was rated as 0 or 100%, and most of the studies were relevant (97.9% [93.7-102.1]). The box plots of each variable are presented in Figure 2.
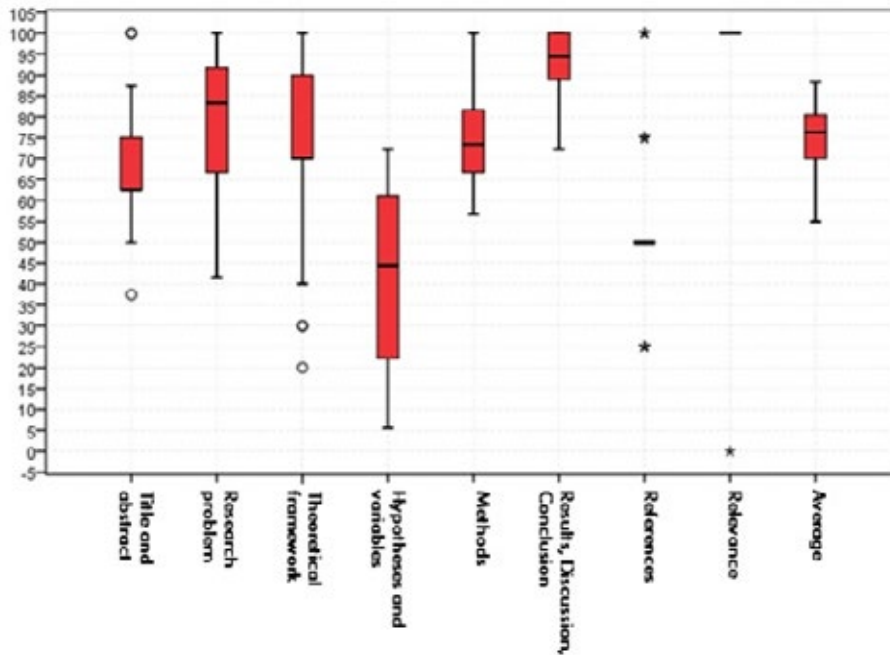
**Figure 2:** Box plots of the standardized study variables

There was a general acceptance level of "Acceptable" in 35 theses (72.9%), and the Hypothesis and References sections were the ones with the greatest weakness at 70.8% and 79.2%, respectively. The results section obtained the best acceptance values in 93.8% of the theses classified as "Excellent", and the results are shown in Table 3. The hypothesis test proposed "the group has an equal or higher acceptable quality at 70%" compared to the acceptance level of 72.9%, the $Chi^2$ was 0.2208 with a P value = 0.6384 without statistically significant differences.

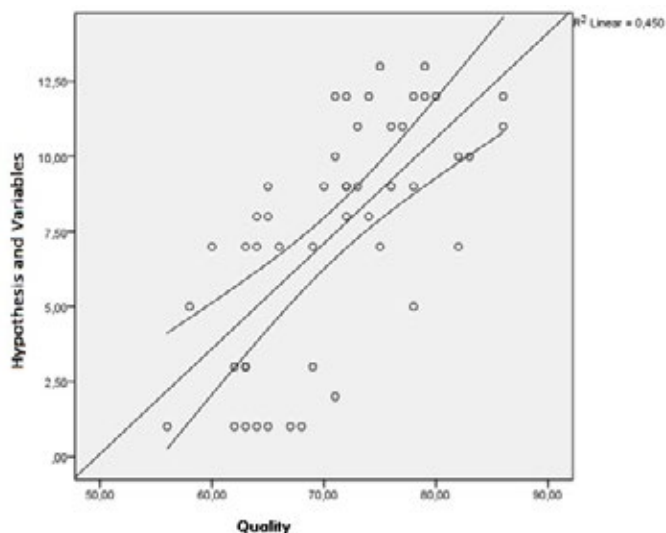**Table 3: Level of acceptance of the quality of academic research**

|  | Excellent | Acepptable | Not acepptable |
|---|---|---|---|
| Title and abstact | 11 (22.9%) | 9 (18.8%) | 28 (58.3%) |
| Research problema | 26 (54.2%) | 15 (31.3%) | 7 (14.6%) |
| Theoretical framework | 13 (27.1%) | 23 (47.9%) | 12 (25%) |
| Hypotheses and Variables | 1 (2.1%) | 13 (27.1%) | 34 (70.8%) |
| Method | 12 (25%) | 31 (64.6%) | 5 (10.4%) |
| Results | 45 (93.8%) | 3 (6.3%) | 0 |
| References | 5 (10.4%) | 5 (10.4%) | 38 (79.2%) |
| Relevance | - | 47 (97.9%) | 1 (2.1%) |
| Quality | 12 (25%) | 35 (72.9%) | 1 (2.1%) |

The very good association analysis between the study variables showed a statistical association between the "Hypothesis and variables" section and the general result of the quality of academic research, r = 0.71 P <0.0001; additionally, associations were reported between the methods section and the quality section. The Theoretical Framework section has an association with the Methods and References section. The data are represented in Table 4, and the best association is represented in a scattergram in Figure 3.

**Table 4: Association between the study variables**

| | n=48 | | Pr | MT | HyV | MET | RDC | REF | CAL |
|---|---|---|---|---|---|---|---|---|---|
| Spearman's rho | T&A | Coeficiente | -0,210 | -0,02 | -0,19 | -0,179 | -0,180 | 0,062 | -0,078 |
| | | P. (2-colas) | 0.151 | 0,89 | 0,19 | 0,223 | 0,221 | 0,676 | 0,597 |
| | RP | Coeficiente | | 0,268 | 0,116 | 0,198 | 0,394** | 0,336* | 0,508** |
| | | P. (2-colas) | | 0,065 | 0,431 | 0,176 | 0,006 | 0,020 | <0,0001 |
| | TF | Coeficiente | | | 0,217 | 0,448** | 0,260 | 0,396** | 0,644** |
| | | P. (2-colas) | | | 0,139 | 0,001 | 0,074 | 0,005 | <0,0001 |
| | H&V | Coeficiente | | | | 0,223 | 0,105 | 0,193 | 0,705** |
| | | P. (2-colas) | | | | 0,127 | ,478 | ,188 | <0,0001 |
| | MET | Coeficiente | | | | | -0,109 | 0,233 | 0,615** |
| | | P. (2-colas) | | | | | 0,460 | ,112 | <0,0001 |
| | RDC | Coeficiente | | | | | | 0,084 | 0,303* |
| | | P. (2-colas) | | | | | | 0,569 | 0,036 |
| | REF | Coeficiente | | | | | | | 0,511** |
| | | P. (2-colas) | | | | | | | <0,0001 |



**Figure 3:** Deprogram between the Hypothesis and Variables and Methodological Quality

## Discussion

The main results of this study report that the quality of academic research in the sample studied has an acceptance rate of 72.9%. A relevance of 97.9%, the worst results were observed in the Title and abstract sections, 58.3% were unacceptable, in the Hypothesis and Variables sections 70.8% were unacceptable, and in the references 79.2% were unacceptable. The "Results, discussion and conclusions" section was excellent in 93.8% of the cases, and the problem statement section was excellent in 54.2% of the cases. It was possible to verify the hypothesis that the study group has an acceptance equal to 70% (Chi2 0.2, p = NS). Within the secondary analyses, an association between "Hypothesis and Variables" and methodological quality was determined, which determines a very good degree of relationship (R = 0.71 P <0.0001). However, it must be taken into account the risk of collinearity between these variables since the first is an important component of the second, which is a summary of the quality of the thesis. In the variables where this collinearity problem does not exist, since they are independent measurements such as the "Theoretical Framework" section and the "Methods" section, a moderate association is shown (R = 0.45, P <0.001).

The importance of the findings cited in this study determines that the quality of educational research in the institution studied has a moderate deficiency because the expected quality level result for postgraduate and master's degrees should be equal to or greater than 95% (Summa Cum Laude), between 90 to 94% (Magna cum laude), between 85 to 89% (Cum laude), and between 70 and 84% (Minimum sufficiency). (Figure 4). It is clearly observed that the hypotheses and variables section and the references section are the most affected of the research sections.
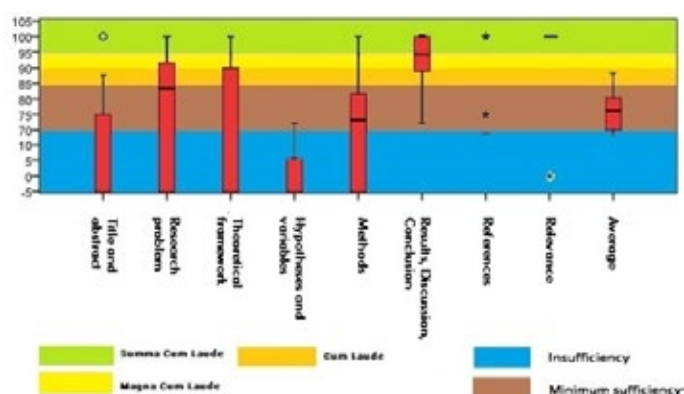


**Figure 4:** Pictogram for the classification of educational research according to the degree of sufficiency for masters and doctorates

Studies with related findings are reported in Peru [1] in a postgraduate assessment of public health, and other reports of undergraduate or nursing careers are not comparable due to different educational themes. The explanations of why the results are probably due to the deficient educational level in research meth-

odology and to referencing weaknesses and probably to the lack of accessibility to software resources for compiling references. These findings are relevant because they expose the current situation of the institution, where a result of minimum sufficiency is achieved for the master's student. The limitations of the study are probably because only one public institution has been taken into account, private institutions and other postgraduate degrees from the institution are not included. Additionally, as it is a descriptive study, due to the nature of the phenomenon, it tends to represent retrospective events that limit academic-educational intervention in research. Future research should be established with the interventional character in the sections where there are more shortcomings to prospectively measure the results and the increase in the quality and solidity of educational research.

## Conclusion
The quality of educational research is equal to the 70% raised in the hypothesis, which highlights a minimum sufficiency rating for the educational research studied in this work.

## Abbreviations
ER: educational research.
T&A: Title and abstract.
RP: Research problem.
TF: theoretical framework.
H&V: Hypothesis and Variables.
MET: Methods.
RDC: Results, Discussion, Conclusions.
REF: References.
REL: Relevance of the investigation.
QOM: Quality of methodology.

## Declarations
Ethical Ethics approval and consent to participate
Does not apply to this type of study.

## Publication consent
Does not apply to this type of study.

## Availability of data and materials
The data sets generated and/or analyzed during the current study are not publicly available due to the confidentiality of the participants but are available through the corresponding author upon reasonable academic request.

## Competing of interest
The authors declare no conflicts of interest.

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