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Abstract -
This work has allowed the development of a case study module using the SPSS statistical software and the module has been used as support material for practical activities in the development of the Statistics Seminar course applied to educational research in the PhD students in the Sciences of the University.

The case study module incorporates statistical data from the thesis found in the archive of the graduate school. The selected theses were of quantitative approach, of experimental research design in its classification of Pre-experimental, Quasi-experimental and Pure Experiments. The study was carried out with a population of 24 students, divided into two groups: control and experimental; To be able to form the groups, an entrance test was applied; the students who obtained the best scores formed the control group and the others the experimental group. The research instruments that were built measure conceptual, procedural and attitudinal learning. The instruments went through the validation and reliability study. With the Posttest scores, the corresponding hypothesis test was performed; the experimental group obtained better results than the control group; This is probably due to having used the case study module through the use of the SPSS software.

Keywords- Education, learning, use of SPSS, case study.

I. INTRODUCTION

Perú is a country that is adapting to the new University Law N° 30220 [1], in which the Vice-Rector's Office for Research is created, Article 43 establishes postgraduate studies and Article 45 specifies the requirements that must be met to obtain the Academic degree of Doctor of Educational Sciences. This work has allowed the elaboration of a Case Study Module, for the learning of the Statistics Seminar subject applied to educational research, as support material for the students of the doctoral program. The document incorporates a study of the theoretical and practical foundations of descriptive and inferential statistics, study background and review of the updated literature.

Students are presented with research data already carried out by authors and graduates and they with the knowledge acquired in the subject, in the hours corresponding to the practical hours carry out the data processing, using in some cases descriptive statistics and others the inferential statistics, especially to perform the hypothesis tests of each case. Taking into account that "the role of the student's constructive activity and the importance of the educational influence of the teacher as the determining factors of this activity. According to [2] "talking about technology is also talking about the human being". Also for [3], the problems associated with the use of "audiovisual equipment as a means of capturing social reality has focused mainly on binomials, such as subjective / objective, reality / fiction, art / science" (p.12). Likewise, he affirms "that an image is worth a thousand words", this means that showing the results of the processes with SPSS software motivates the student to continue checking their theoretical knowledge. Also, as mentioned [4] the student must be provided with "necessary knowledge, skills, attitudes and values", which are very important for their development. The most important thing is that students can construct meanings and attribute meaning to what they learn. [5]. In this sense, for [6] learning based on project methodology or teaching through projects, he states that "(…)he main assumption of the aforementioned teaching methodology is to demand an active attitude from the student in the formation of his knowledge, either solving problems, making decisions, investigating or documenting information" (p. 155)
Taking into account the foundations of student learning, [7] it must be evaluated or measured through conceptual, procedural and attitudinal knowledge.

Three case studies were presented to the control and experimental groups, they developed all the statistical treatment processes up to the corresponding hypothesis test. As stated [8] to both groups, a test of conceptual, procedural and attitudinal knowledge of the subject contents is applied. Quasi-experimental design was used,

measured before and after. From the analysis of the results obtained, the experimental group obtained a positive significant difference than the control group and this is probably due to the application of the MatLab Case Study Module.

II. DEVELOPMENT OF CONTENTS

According to [1] to date March 14, 2020, 93 universities and 02 graduate schools have been licensed, and 43 universities and 02 graduate schools have also been denied. Most licensed universities offer doctoral study program.

University history

The university included in 1956 and the professionalization regime for practicing teachers without a pedagogical title. The university included in 1956 and the professionalization regime for practicing teachers without a pedagogical title. In 1965, once again ratifying its significant contribution to the country's education, by law 15519 it became the National University of Education, a fact that took shape two years later, on May 23, 1967.

In the mention of Doctorate in Education Sciences of the UNE, in each academic semester 30 students are admitted. Graduates in 2018 and earlier were surveyed about the difficulties they had in completing their undergraduate thesis and the results are shown in Table 1.

Study of cases.

The Case Study Methodology is applicable to social and educational phenomena [9]; on the other hand, [10] classify the case study designs as “experimental, such as those applied in the field of medicine; non-experimental transectional, which involves studying a case at a specific time or longitudinal”. Also, as stated [11] “the case study is not a simple description of a specific event or situation, but as in any investigation, evidence is systematically collected, the relationship between variables is studied and the investigation is methodically planned" and in [12] the scheme of an investigation using case studies is based, as shown in Fig. 1.

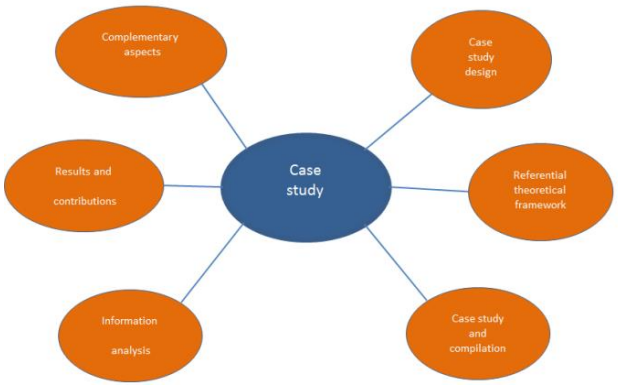

Fig. 1 Outline of an investigation approach using case studies, see [12].

Selection of cases.

As stated [13] “sometimes it can be useful to select cases that are typical or representative of other cases, but it is unlikely that the sample of only one case or a few cases is a representation of others", that is why the Participants of the subject form small groups of three members and each group select the thesis of the case submitted and carry out a critical reading that is constructive, of the design and data processing that the thesis presents.

Taking into account [14] we can highlight “how the current trend of socio-educational research focuses on combining quantitative and qualitative methods of obtaining and analyzing information. The first ones are based on the reduction of the information to numerical values to quantify them and establish magnitudes and the second on the reduction of the information to categories with a reconstructed meaning from the actual reality investigated, through content analysis.

[15] states that “The case study is, in many ways, theoretically compatible with the needs and resources of the small-scale researcher. It allows, and even requires, to focus on a single example (or perhaps two or three). The focus may be the researcher's workplace or any other institution with which they have connections: A company, a body of volunteers, a school, a ship, or a prison; or an element of that institution: a class, a work or soccer team or a community group. It is also possible to focus on one individual or on a small number of individuals, such as in the life stories or in the analysis of the career of the great entrepreneurs and how they reached the position they occupy today”

Teaching cases and research cases

Referring to cases [15] he maintains that the opinions of use of cases is an experience of inclusion, which also sees reasoning, intuition and induction; in the same line [16] it states that science incorporates many components. Nor is it reduced to being a single element, the author states that science "has daily knowledge as its source, and has the characteristics of having a certain object of study, a certain method -or several- (…)”.All this means that teaching must be participatory and inclusive. The teaching-learning process must make use of didactic materials that help the teacher to impart the knowledge of the subject to be developed and the method of using cases appears as an extremely appropriate procedure for the student to discover, ask questions and can be clear about the research fundamentals and related to the application of SPSS in their learning tasks.

As [16] argues that the perspective of knowing and handling cases that illustrate their application of the data processing stages makes the method have an integrating horizon, to relate the other study contents. According to [17], the case studies have the elements “Report of the presented case, the discussion of the case, the analysis of the case and the real situation” (p.144)

Summarize Zanotti (2003): “As surprising as it may seem, the entire post-Popperian debate on science has led to the following conclusions: a) science depends on meta-physical presuppositions (Popper); b) science cannot prove exactly, nor can it falsify or corroborate exactly (Popper); c) science is not handled with bare facts of interpretation, since the supposed objective facts are interpreted from the theory that we want to test (Popper); d) science depends on historical paradigms so close to the scientist's mentality that the scientist does not see them as such (Kuhn); e) science, conscious of it or not, runs the risk of progressiveness or not of those paradigms (Lakatos); f) science depends on bold positions that break rules, rather than following them (Feyerabend).”

According to [17], the investigation cases generally adopt an integrative perspective and ratify; in addition, a case study deals with fully a technically supported situation in which there are many more variables of interest than observational data (…) Benefits from the prior development of theoretical propositions that guide the collection and analysis of data.” (p.13)

[18] He states that "The study of chaos is a didactic strategy that is approached from a constructivist learning perspective. For this reason, aspects such as: a strategy focused on the student person and not on the teacher should be considered; spaces for discussion and construction of knowledge; the search for information sources by the group autonomously, without those sources being given to them; the teaching person as facilitator and counselor of the process; and, an evaluation that allows aspects to be assessed not only from the quantitative but also from the qualitative aspects, such as attitudes and values." (p. 9). As, [19] says: "It is convenient for the teacher to make the case under study available to the student at least one week in advance, at which time the initial or preliminary phase would begin"; steps must be instilled in the student: Comprehensive reading of the case, familiarize yourself with the case, collect the data, reflect on the case and present the results obtained. It should be understood that, according to [19] "the quality of the case developed is an essential aspect when motivating students in their resolution, however, the teacher's ability to lead is just as important - or even more so as possible the debate, guide the discussion and support a deeper reflection in the analysis of the issues raised in the case"

According to [20] "paradigms are achievements that arise from the many problems that past scientific achievements leave to be solved by a group of scientists; that is to say, that the acquisition of a new paradigm is a sign of maturity in the development of any given scientific field, affects the structure of the group that practices in it and implies a new and faster definition of it.". The common pattern of science matures the revolutionary scientific transformations that have laid the foundations for the advancement of the method of scientific research.

It should be pointed out that there are no experiences in Peruvian and other universities, referring to the application of a case study method in the teaching-learning process of the Seminar on Statistics applied to educational research in the [21].

In this context, the research team set out to use the case study method, for the learning of statistics seminar applied to educational research at the UNE, that allow to overcome the traditional way of teaching to take application exercises selected by he and that they are not real data that work in the doctoral theses of the university. To make you reflect, constructively criticize the applied statistical methods, for each research design proposed by the theistic.

Learning

As they refer [22], Conceptual knowledge is more complex than factual. It is built from the learning of concepts, principles and explanations, which do not have to be learned literally, but abstracting their essential meaning or identifying the defining characteristics and the rules that compose them, procedural knowledge is that referred to how to execute internalized actions such as intellectual and motor skills; encompass skills, strategies, processes that involve a sequence of actions or operations to be carried out in an orderly manner to achieve an end and we must indicate that in the same stream of knowledge [22] maintains that attitudinal knowledge is made up of values, norms, beliefs, and attitudes aimed at personal balance and social coexistence.

III. METHODOLOGY

A. Identification of the study area

The Graduate School of [1], s located in the district of La Molina, Lima. It has around 180 students in the mention of doctorate in Educational Sciences, as indicated in Table 1, one of its weaknesses is the attention of the subject Seminar on Statistics applied to Educational Research. Students mention that teachers do not instruct them with cases or data from real situations in the study of statistical processing, such as: Know the research design and the corresponding statistical processing model, validation, reliability study, sample choice and hypothesis testing for each case.

B. Population and sample study

The study population was 30 students, none with any disability, and an entrance test of conceptual, procedural and attitudinal knowledge was applied to all of them, based on the foundations of [5], [22] for the contents of the subject; then, the results obtained were processed; Of this, the 12 students with the best results were taken as the control group, and the 12 students with the lowest results constituted the experimental group. It is indicated that there were no students with hearing or visual impairment in the sample.

We obtained the permission of the officials for the use of the two computer laboratories of the Graduate School of the UNE, each with a capacity of 20 students, each student is assigned the resource of a computer. In these environments the research was carried out.

C. Production of the Learning Module

The members of the research group determined the case studies that were incorporated in the development of the subject. The Case Study Module with SPSS for the learning of Statistics Seminar applied to educational research, was elaborated incorporating the data obtained from the theses found in the archive of the graduate school; the data that were selected were from the correlational, pre-experimental, quasi-experimental and pure experimental descriptive design. The experimental group in each class had to use these data to process from the description of the data to the hypothesis test with SPSS, and which for the majority was easy to handle and understand. Also, with said data provided, the students elaborated the design of the statistical model for data processing, instrument validation, reliability study and hypothesis testing, as required [16], [23].

D. Identification of reality

Reality confirms that there is a need to address the problems of the teaching-learning process, as shown [5], [22]; especially to influence the teaching of the fundamentals and applications of statistical methods to doctoral students.

E. Development of the experiment

For the development of this experiment, two working groups were taken into account, one experimental and the other control. The experimental group was led by a teacher who developed the subject using the SPSS learning module that was developed and the control group was led by another teacher in the traditional way.

1) Type of investigation: The research proposed is of the social technology type, as proposed [24] with two groups: one of control and the other experimental; measured before and after, in the development of the Seminar on Statistics applied to educational research.

2) Research design: As indicates [24], [25] he research design is experimental, in its quasi-experimental classification with two groups: control (G_C) and experimental (G_E), which were subjected to Pre-test (O_1 y O_2) and Post-test (O_3 y O_4).

Research Outline

G_E: O_1 X O_2

G_C: O_3 --- O_4
Where:
G_E: Experimental group
G_C: Control group
O_1, O_3: Pre-test
O_2, O_4: Post-test
X: SPSS case study module
--: Traditional way.

3) Data collection techniques: The data collection instruments used were: Case study module with SPSS, Conceptual, procedural and attitudinal knowledge test. The tests were applied at the beginning and end of the academic year to both groups..

4) Validation and reliability: The instruments mentioned were validated by expert judgment and the three experts who validated expressed their opinion as "very acceptable" and the average of the KR20 coefficients was 0.80 (highly reliable), that is, the instruments were valid and reliable.

IV. RESULTS

The present work allowed verifying the usefulness and relevance of the application of the Case Study Module with SPSS in the teaching-learning processes of statistical methods in doctoral students.

TABLE 1
RESULTS OF THE STUDENT SURVEY.

What difficulties did you have in your PhD studies?	Frequency	%
Lack of teaching-learning material	2	13.33
Advisors are inexperienced	3	20.00
Difficulties in applying statistical methods	5	33.33
Difficulties in determining the research design	3	20.00
Lack of time for study	2	13.33
Total:	15	100

In Table 1, it can be seen that 33.33% of the respondents (higher percentage) state having had "Difficulties of applying statistical methods".
The field work allowed to reach some conclusions of the problem in the Graduate School of the university.

Table 2 shows the opinion of 20 students and 5 teachers on the reality of the development of the subjects in the Graduate School; In it, it is observed that both groups coincide in the needs and the existing problems in the development of the subject Statistics Applied to Research.

TABLE 2
RESULTS OF THE SURVEY OPINION TO STUDENTS AND TEACHERS.

Problematic	Students' opinion	Opinion of the teachers
1. The projects are not related between problem, objectives and hypotheses.	Students do not conceive their research problem well, they do not look for a problem related to their work field and little relation to their job performance in their specialty.	Teachers do not teach well the application of the scientific method to determine a research problem and therefore there are difficulties between research objectives and hypotheses.
2. Many observations in statistical data processing	There is a great deficiency on the part of the students in the handling and application of the statistical methods in the investigations of quantitative approach.	The teachers who are in charge of the Statistics subjects do not present specific situations and experiences of using data from existing theses.
3. The teaching methods of teachers	They have pedagogical and didactic management and expertise and there are teachers who take courses that are not their specialty.	Little dedication and effort to his/her teaching task. Methods and didactics not according to current reality.
4. Ignorance of teachers of the subjects they teach	Many of the teachers say they know the topics or content they teach.	Most teachers teach classes on topics that are not their specialty or professional career or do not have experience in quantitative and qualitative research.

This indicates that there is a reality that must be overcome not only in the subject of study, but in the other training subjects of the future doctor of Education Sciences.

The scores as a result of applying the Post-test are shown in Table 3.

TABLE 3
POST-TEST RESULTS: CONTROL AND EXPERIMENTAL

	Experimental			**Control**		
N°	Conceptual	Procedural	Attitudinal	Conceptual	Procedural	Attitudinal
1	16	15	4	13	14	3
2	12	17	5	12	13	4
3	17	13	5	15	11	4
4	16	15	5	14	14	2
5	16	16	3	12	14	3
6	16	15	5	14	15	3
7	18	18	3	16	14	2
8	15	17	5	14	12	4
9	18	16	4	16	16	3
10	15	16	6	12	14	5
11	16	17	5	16	14	5
12	12	17	4	14	11	2

1) Normality Study
As the sample size is small and the number of data or observations is less than 50, the study of Normality of the data was performed with Shapiro see [23]; The results are shown in Table 4, almost all p value (Sig.) is greater than 0.05; hypotheses were contrasted with non-parametric statistics; that is, in this case for two independent groups with Mann-Whitney, as indicated in Table 5.

TABLE 4
NORMALITY TEST

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistical	gl	Sig.	Statistical	gl	Sig.
Control_Concep	0,167	12	0,200*	0,877	12	0,081
Control_Proc	0,297	12	0,005	0,882	12	0,093
Control_Act	0,205	12	0,174	0,891	12	0,123
Exp_Concep	0,252	12	0,034	0,853	12	0,040
Exp_Proc	0,188	12	0,200*	0,917	12	0,259
Exp_Act	0,293	12	0,005	0,867	12	0,060

TABLE 5

NORMALITY BY GROUPS AND LEARNING TEST

Group	Pre-test	Pos-test
Experimental	It differs from the normal distribution	It differs from the normal distribution
Control	It differs from the normal distribution	It differs from the normal distribution

2) Hypothesis testing: The general hypothesis of the investigation was as follows:

H_0: The Case Study Module with SPSS does not significantly influence the Learning of Statistics applied to educational research in Doctorate students of the National University of Education.

H_1: The Case Study Module with SPSS significantly influences the Learning of Statistics applied to educational research in Doctorate students of the National University of Education.

This general hypothesis is tested using the three specific hypotheses posed by its conceptual, procedural, and attitudinal learning dimensions. [5], [22].

The results obtained by the Mann-Whitney U statistic for independent groups in the learning of conceptual, procedural and attitudinal knowledge; considering the significance level 0.05 with two tails, they are:

1. From the Post-test of conceptual knowledge of the results of the control and experimental group, p value (Sig. Asymptotic (bilateral)) is 0.030, which is less than 0.05; reason why the null hypothesis is rejected and the alternative hypothesis is accepted.
2. From the Post-test of the procedural knowledge of the results of the control and experimental group, p value (Sig. Asymptotic (bilateral)) is 0.001, which is less than 0.05; reason why the null hypothesis is rejected and the alternative hypothesis is accepted.
3. From the Post-test of attitudinal knowledge of the results of the control and experimental group, p value (Sig. Asymptotic (bilateral)) is 0.013, which is less than 0.05; reason why the null hypothesis is rejected and the alternative hypothesis is accepted.

By testing the specific hypotheses 1, 2 and 3, the general hypothesis is proved; in other words, "The SPSS Case Study Module significantly influences the Learning of Statistics applied to educational research in Doctorate students of the National University of Education."

The students of the experimental group obtained a positive difference of1.58 n the learning of conceptual knowledge, 2.50 in procedural knowledge and **1.1.7** n attitudinal knowledge; this is probably due to the use of the learning module used see Figure 1

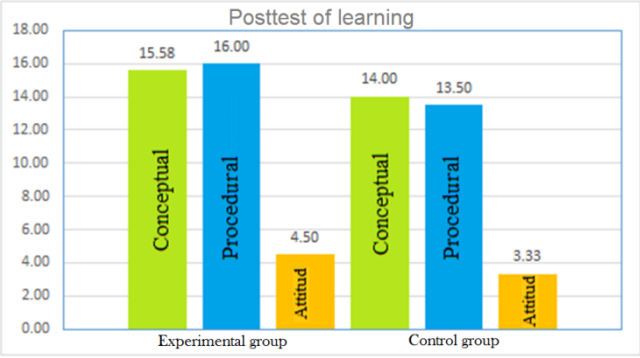

Figure 1. Posttest results

3) Conclusions: From the results obtained, we can conclude that:

The use of the SPSS case study module significantly improved the conceptual, procedural, and attitudinal learning of students in the Statistical Seminar course applied to educational research in Doctorate students at the National University of Education.

The members of the experimental group achieved better results in their scores compared to the control group; as can be seen in Figure 1; This is probably due to the use of case study learning material with SPSS. Also, the students have presented an improvement in their attitudes towards the course and study.

Students who did not have a predisposition to use computer tools and the use of educational materials that allow them to complete the full cycle of statistical data processing have been integrated and included. Each of the participants processed their data obtained or collected using the research instruments of their thesis.

It was found that teachers do not present specific situations or real situations to motivate them to learn statistical methods using computer tools, without losing sight of the fact that conceptual knowledge is very important for interpreting the results.

SUGGESTION

In the next works, efforts should be made to develop teaching-learning materials for students with hearing and visual disabilities, using all the development of current technology.

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