In mid-1999 was conceived within the Faculty of Engineering, a controversy between two teachers with the convenience of using the Computer Assisted Teaching for better development of student performance to take the course Operating Systems. Because of this academic controversy and to demonstrate the great advantages of computer in teaching, it was decided to conduct this research project.

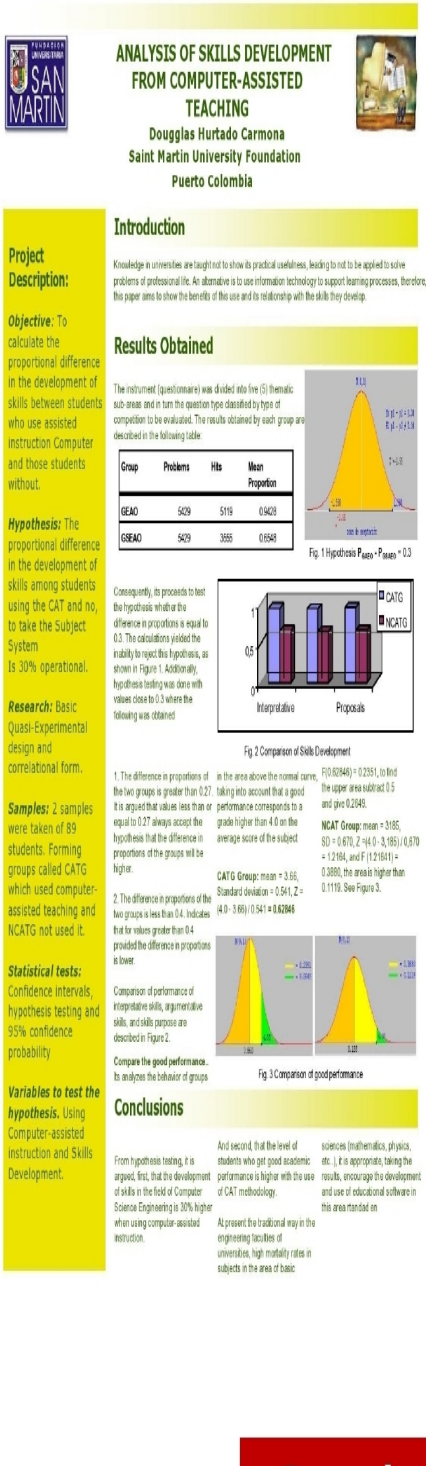
In this project aims to calculate the proportional difference in the development of skills among students using the Computer Assisted Teaching (CAT) and those without. To this end, we propose the hypothesis that the proportional difference in the development of skills among students using the CAT and those without, to study the subject Operating Systems is 30%.

This will define the basic research project as a Quasi-Experimental design and correlational form, where they took 2 samples of 89 students, forming groups: CATG, which used computer-assisted instruction, and not used, NCALG. These groups was administered as a questionnaire and obtained partial notes on the subject. To obtain the results, we evaluate the hypothesis and compared the groups formed in the development of skills and academic performance.

ISBN 978-1-257-81756-6
90000
9 781257 817566
ID: 10783279
www.lulu.com

ANALYSIS OF SKILLS DEVELOPMENT FROM COMPUTER-ASSISTED TEACHING

Analysis of skills development from computer-assisted teaching



ANALYSIS OF SKILLS DEVELOPMENT FROM COMPUTER-ASSISTED TEACHING

Dougglas Hurtado Carmona
Saint Martin University Foundation
Puerto Colombia

Project Description:

Objective: To calculate the proportional difference in the development of skills between students who use assisted instruction Computer and those students without.

Hypothesis: The proportional difference in the development of skills among students using the CAT and no, to take the Subject System Is 30% operational.

Research: Basic Quasi-Experimental design and correlational form.

Samples: 2 samples were taken of 89 students. Forming groups called CATG which used computer-assisted teaching and NCATG not used it.

Statistical tests: Confidence intervals, hypothesis testing and 95% confidence probability

Variables to test the hypothesis. Using Computer-assisted instruction and Skills Development.

Introduction

Knowledge in universities are taught not to show its practical usefulness, leading to not to be applied to solve problems of professional life. An alternative is to use information technology to support learning processes, therefore, this paper aims to show the benefits of this use and its relationship with the skills they develop.

Results Obtained

The instrument (questionnaire) was divided into five (5) thematic sub-areas and in turn the question type classified by type of competition to be evaluated. The results obtained by each group are described in the following table.

Group	Problems	Hits	Mean Proportion
GEAO	5429	5119	0.9429
GSEAO	5429	3555	0.6548

Fig. 1 Hypothesis $P_{GAEO} - P_{GSAEO} = 0.3$

Consequently, its proceeds to test the hypothesis whether the difference in proportions is equal to 0.3. The calculations yielded the inability to reject this hypothesis, as shown in Figure 1. Additionally, hypothesis testing was done with values close to 0.3 where the following was obtained

Fig. 2 Comparison of Skills Development

1. The difference in proportions of the two groups is greater than 0.27. It is argued that values less than or equal to 0.27 always accept the hypothesis that the difference in proportions of the groups will be higher.

2. The difference in proportions of the two groups is less than 0.4. Indicates that for values greater than 0.4 provided the difference in proportions is lower.

Comparison of performance of interpretative skills, argumentative skills, and skills purpose are described in Figure 2.

Compare the good performance..
Its analyzes the behavior of groups in the area above the normal curve, taking into account that a good performance corresponds to a grade higher than 4.0 on the average score of the subject.

CATG Group: mean = 3.66, Standard deviation = 0.541, Z = (4.0 - 3.66) / 0.541 = **0.62846**

F(0.62846) = 0.2351, to find the upper area subtract 0.5 and give 0.2649.

NCAT Group: mean = 3.185, SD = 0.670, Z =(4.0 - 3,185) / 0,670 = 1.2164, and F (1.21641) = 0.3888, the area is higher than 0.1119. See Figure 3.

Fig. 3 Comparison of good performance

Conclusions

From hypothesis testing, it is argued, first, that the development of skills in the field of Computer Science Engineering is 30% higher when using computer-assisted instruction.

And second, that the level of students who get good academic performance is higher with the use of CAT methodology.

At present the traditional way in the engineering faculties of universities, high mortality rates in subjects in the area of basic sciences (mathematics, physics, etc..), it is appropriate, taking the results, encourage the development and use of educational software in this area mandad on

Dougglas Hurtado Carmona

ANALYSIS OF SKILLS DEVELOPMENT FROM COMPUTER-ASSISTED TEACHING

DOUGGLAS HURTADO CARMONA

ANALYSIS OF SKILLS DEVELOPMENT

FROM COMPUTER-ASSISTED TEACHING

Dougglas Hurtado Carmona

ISBN: 978-1-257-81756-6

Translated from:
Análisis del desarrollo de competencias desde la enseñanza asistida por computador
© 2011. ISBN: 978-1-257-81753-5

More information:

dhurtado@samartinbaq.edu.co
dougglash@yahoo.com.mx
dougglas@gamil.com

ACKNOWLEDGEMENTS

GOD Almighty.

San Martin University Foundation, *especially Dr****. José Santiago Alvear,*** *and the Faculty of Engineering* ***(Jorge, Lucho, Horacio, Nelson and Karol).***

Students in the course Operating systems
Very vividly unwittingly participated in this project

AUTOR

DOUGGLAS HURTADO CARMONA

Master of Computer Systems Engineering, Computer Systems Engineering, Minor in Business Administration and Information Systems Security. IBM Certification in Information Systems Management. Diploma in Scientific Research, Development for Web Applications, Computer Security and Forensic Computing, and in education and pedagogy.

Since 2002 he works as Head of Research at the Faculty of Engineering of the San Martin University Foundation Headquarters Puerto Colombia, Barranquilla - Colombia.

National and international lecturer with 12 years of university teaching experience in the areas of Programming Objects, Data Structures Object Oriented, Systems Theory, Systems Analysis and Design, Operating Systems, Compilers, Databases, Programming Concurrent and Client / Server Java, application development for Internet, computer security, computer forensics and contingency plans.

Researcher on the topics of Information Security, Computer Forensics, General Systems Theory and dynamic systems for software engineering, and compiler theory. Developed the research "Analysis of skill development from the use of Computer Assisted Teaching" which received Special Mention Awards ACOFI 2007, and "Methodology for the development of systems based on learning objects." Creator OSOFFICE, Educational Software for Teaching Operating Systems.

He has served as Director of software development projects, systems analyst and programmer, IT project manager, information security engineer, independently has advised companies involved in building software.

TABLE OF CONTENT

Chapter

1 *PREPOSITION OF THE INVESTIGATIVE PROJECT*

INTRODUCTION

In universities are transmitted -in the best case built-, knowledge without showing their practical utility. This leads to many of them are forgotten and, worse, never be taken into account in resolving problems of professional life.

By its abstract nature and difficult experimentation, some knowledge is not treated properly by the students. This creates the motivation and a sense that the concepts are on the board and are not captured in its practical approach, moreover, students do not grasp the concepts easily reference and does not stimulate their analysis. [Hurtado y Neira, 1995] In fact, these students are denied the capacity to nourish them on a professional level for higher performance in their workplace. On the other hand, inadequate skills development affects mood and self-esteem in individuals when faced with critical situations such as impact on professional work and personally.

One approach for addressing these shortcomings is: using information technology to support learning processes has been a concern that has long been investigated and proven by many people. Its inclusion within educational institutions, including the home has increased in recent years; with demand for high-quality educational software is growing. [Gómez, Galvis y Mariño, 1998]

Today we know that this use of information technology has become commoditized and evolved along with tools that take advantage of new technologies, this is speaking in the first instance, the use of ICT, ***Information and Communication Technology***, in the education; from school for radio (radio school) through the use of television programs with educational support, to reach the remote education, virtual classrooms, online education, what is known as virtual education.

In a second instance the use of computers in education has specialized giving rise to the so-called learning objects according to [Aproa, 2007] "A learning object (LO) corresponds to the smallest independent structure that contains an objective, learning activity, a metadata and an evaluation mechanism, which can be developed with info-technologies (ICT) so as to facilitate reuse, interoperability, accessibility and long life". It should be noted that the tool used to perform computer-assisted instruction is composed of several learning objects.

This work is aimed at researchers, teachers and managers of educational institutions in order to motivate them to use computer-assisted instruction in any of its forms, in their courses, to show the benefit gained in the development the competence of their students to use.

This documentation represents an extract of the most important aspects of the research performed, the extract is presented in the following way: First of all, his description and brief description of the problem, then work goals, then those aspects relating to assumptions and methodology and the description of the information collected, hypothesis testing and analysis are discussed below, and finally describe the results of academic performance and sets out the conclusions and recommendations.

PROJECT DESCRIPTION

Project Title

This research work has been titled with the name of *analysis of skill development from computer-assisted instruction.*

Summary

In this project aims to calculate the proportional difference in the development of skills among students using the Computer Assisted Teaching (CAT) and those without. To this end, we propose the hypothesis that the proportional difference in the development of skills among students using the CAT and those without, to study the subject Operating Systems is 30%.

This will define the basic research project as a Quasi-Experimental design and correlational form, where they took 2 samples of 89 students, forming groups: CATG, which used computer-assisted instruction, and not used, NCALG. These groups was administered as a questionnaire and obtained partial notes on the subject. To obtain the results, we evaluate the hypothesis and compared the groups formed in the development of skills and academic performance.

Keywords: Skills Development, Computer Aided Teaching, Engineering, Operating Systems, Software education.

Motivation (Anecdote)

In mid-1999 was conceived within the Faculty of Engineering, a controversy between two teachers with the convenience of using the Computer Assisted Teaching for better development of student performance to take the course Operating Systems. Because of this academic controversy and to demonstrate the great advantages of computer in teaching, it was decided to conduct this research project.

Interested entity

The entity concerned is the Faculty of Engineering of the San Martin University Foundation Puerto Colombia headquarters in the city of Barranquilla, Republic of Colombia.

Estimated cost and time

An estimated total cost of seventy-six millions three hundred eighty-six thousand seven hundred and fifty pesos Colombian with 00 cents ($ 76'386.750). Development time of this Research corresponds eight (8) semesters academic from second 1999 until first 2003, which are 128 weeks approximately from project approval.

RESEARCH PROBLEM

Brief Description of the Problem

In the first curriculums -ran the 1997 to 2003- the program of Computer science Engineering used in less than 10% of their teaching subjects from the use of educational software and / or application (CAT). This is possibly a result of the following situations:

Lacking or inappropriate Integration of CAT in the culture of teaching in the institution: Many professors, deans and managers have very weak notions of teaching contribution representing the CAT. "Know" that works because they get the news from abroad, but not displayed as part of their culture of teaching in higher education. Just be content with the "idea" that will someday be widely used: "This is the Tool of the Future" they say. [Hurtado y Neira, 1995]

Little awareness of the benefits in using a tool CAT in higher education: By not integrating CAT in the culture of teaching, it is clear that is not used, and therefore there will be no training plans and training, further promoting the development of educational software projects will be null and void is the acquisition of such tools. With all the above is even larger gap of ignorance of the educational benefits of the CAT.

Wrong conception of what an educational software in conjunction with the association "expenditure" without monetary gain: The majority of managers perceive the software generally, including education, as an "object or an abstract entity" very accessible to their understanding represents one more expense. On the one hand, this conception generates a rejection of the unknown, and secondly, a "cost" should be avoided as much as possible. Consequently, managers do not invest in such tools as "unknown" have educational potential**.** [Hurtado y Neira, 1995]

Poor infrastructure in data centers: Thus, as the software regarded as an "object or an abstract entity" very accessible to his understanding that represents an expense over the hardware is regarded in the same way.

Management to computer fraud fears: the paradigm "I do not know much about it and I can cheat" over the institutions fallible computer deceit and unscrupulous people say what they want to hear.

Poor computer literacy of the directives: higher education institutions do not have positions in your organization "vice" for the management of IT projects, it is then, managers with no experience or computer literacy are responsible for these tasks. No training

Lack of contextualization of the subjects aimed at the utilization of the CAT: Many subjects in the Systems Engineering Program remain "on board" and are not captured in its practical approach, moreover, students may not easily grasp the concepts referencing and analysis is not encouraged.

In fact, students of computer science Engineering (and other professions) are deprived of a tool that would foster a professional level for higher performance in their workplace. Concepts that could be assimilated in better shape using educational software, then not used, poorly focused and poorly treated.

Finally, in addition to not acquiring the tools CAT, does not generate motivation for the design and development of educational software projects in the students.

Problem Formulation

This project seeks to answer the following question:

What is the difference in the level of learning among students of the Engineering of computer science program to study the subject operational systems through the CAT and without CAT?

JUSTIFICATION

This research aims to exclusively find the difference in the level of student learning Computer science Engineering Program, Faculty of Engineering at San Martin University Foundation using CAT. and not, as well as related aspects.

This will enable managers, deans and even teachers, encourage the creation of an information culture within the institution, and create procedures for the evaluation and acquisition of educational software, also generating initiatives for the design and construction projects CAT tools. in college. Similarly, students can conceptualize the concepts and practical use in their professional development.

With the socialization of the results is intended that institutions are aware of the benefits of the Computer-Assisted Teaching, and so create or enhance the integration of this educational culture.

Another objective is to change the idea that the educational software product is an expense; with concrete actions to improve the quality of education have an impact on institutional prestige to turn back to other aspects as monetary gain enrollment, access resources for teaching and research, etc:

OBJECTIVES

The general objective which seeks to achieve in this investigation is stated as follows:

Calculate the proportional difference in the development of skills among students using the CAT and not use it, to study the subject Operating Systems, to develop strategies to, in part, to teachers using the CAT in pedagogy class, and in part to encourage the generation of construction projects Educational Software.

In order to tackle with the overall goal described above, must meet the following goals.

- *Define Operating Systems topics that serve as the basis for conducting the research.*
- *Select educational software and / or application of knowledge applicable to the area defined Operating System to be used in the process of establishing the differences in levels of student learning.*
- *Design of data collection instruments.*
- *Select the experimental sample.*
- *Apply information gathering tools to the selected sample.*
- *Test the hypothesis of the project and analyze the results to make, pictorial*

HYPOTHESIS OF THE PROJECT

Type of Hypothesis

Given that the current project is framed to compare the behavior of Students using the CAT and those without, to attend Operating Systems Course, we certainly say that the formulation type Hypothesis of this project is to **group differences.**

Statement of Hypothesis

Under the objective sought with this research is to know if you can accept the following hypothesis:

H1: *The proportional difference in the development of skills among students using the CAT and not use it, to study the subject Operating Systems, is 30%.*

VARIABLES

Description of Variables

To verify the hypothesis proposed in the draft the following variables: *Using Computer-assisted Teaching*; and *Skills Development*, which are described below:

Using Computer-Assisted Teaching

The Use of Computer-Assisted Teaching is, as its name indicates, the use or not of a computational tool to support teaching and learning process in the computer science engineering program in the subject Operational Systems for selected the experiment.

Behavior "causal" or "influences" that characterizes the variable Using Computer-Assisted Teaching defines its character as **Independent**. Its dimension is teaching the course Operating Systems. Has a single indicator known **use**, takes discrete values and Boolean (True or False).

Skills Development

This feature describes the state of performance of the knowledge, skills and values result of the learning process towards effective development of a professional activity related to the operational systems.

The hypothesis seeks to understand the relationship between use of Computer Assisted Teaching and the effect it has to develop skills, which is why this is classified as a **dependent** variable in the first (Use of Computer Assisted Teaching).

The variable Skills Development has three (3) dimensions: The Interpretative, the Argumentative and the Proposals. The **Interpretative** framed achievements based on the ability to make sense from either a text, a proposition, a problem, etc. The **Argumentative**, based on the extent of achievement orientation to account for a statement, articulate concepts and theories to support, justify, build relationships, demonstrate and conclude. Finally, the **Proposals**, based on achievements such as: proposing hypotheses, solve problems and build alternative solutions.

In the three dimensions of this variable have an indicator called the **hit ratio**. This indicator shows actual values between 0 and 1 that are the result of the ratio of correct hits and the number of tests. The hit ratio determines a qualitative assessment as follows:

- **Poor**: When we get less than 60% of the hits. [0% -59%]
- **Acceptable**: When we get between 60% to 79% of the hits. [60% -79%]
- **Good**: When we get between 80% to 90% of the hits. [80% -90%]
- **Excellent**: When you get hit over 90%. [91% -100%]

Operationalizing Variables

The process of operationalization, i.e. the empirical consequences of the variables described in the following table (Table 1) taking into account its dimensions and performance indicators

TABLE 1. OPERATIONALIZING VARIABLES

Variables	Dimension	Indicators
Using Computer-Assisted Teaching	Teaching the course Operating Systems	USE
Skills Development	1. Interpretative	Hit ratio
	2. Argumentative	Hit ratio
	3. Proposals	Hit ratio

DESIGN METHODOLOGY

Adopted Design

Research design is **Quasi - Experimental**, because it deliberately manipulates the independent variable use of CAT in order to observe the behavior of the dependent variable skills Development, also because the comparison groups are not randomly selected or matched, but these groups are already formed before applying the experiment, i.e. they are intact groups.

We may add that the basis of the experiment is to apply the instrument to a single subject courses, where CAT use and others what not uses in different semesters

Research Type

The type of research is **basic** and that this project is undertaken the task of obtaining knowledge or principles in order to create a point of support for troubleshooting. In addition, because this project has an immediate goal theory.

Moreover, based on the type of experiment, we can say that this project presents the form of **correlational** research are intended to show the relationship between variables.

Information Collection techniques

Primary data collection techniques

The source of primary gathering that will be used project presently is the **Survey**, with **Experimental** modality, using the Instrument **Questionnaire**.

Description of the instrument

The instrument (questionnaire) was divided into five (5) sub themes: Fundamentals of Operating Systems, Process Management, Memory Management, File Management and secondary storage, and communication processes and process control. Which in turn are classified according to the type of question the kind of competition to be evaluated. The instrument is as follows:

TABLE 2. RESEARCH TOOL

Sub theme I: **Fundamentals of Operating Systems**
A.Interpretative competences
1. Define the concept of Operational System 2. Name the Classification of operation system 3. Describe the structure of Operating Systems
B.Argumentative competences
4. Arguing the History of Operating Systems 5. Make a comparative table of the types of Operating Systems. Give examples of current market 6. Find the differences between monolithic and hierarchical structure of Operating Systems.
Sub theme II: **Process Management - Planning Processor**
A.Interpretative competences
7. Define the concept of Process 8. Define the PCBs 9. Define to the system queues 10. Define the evaluation indexes
B.Argumentative competences
11. Describe the importance of the concept of multitasking 12. Describe the importance of planning processes 13. Make a graphic description of the states of processes 14. Build a comparison chart describing the functioning of the policies FCFS, SJF, Round Robin, by priority, appropriate SJF, appropriate priorities

C.Propositional competences

15. Building a method or function that simulates the operation of the FCFS policy
16. Building a method or function that simulates the operation of the policy by appropriate priorities
17. Find the best planning, noting the changes in the tails of the system, comparing the average waiting time and creating the corresponding Gantt charts, using the following data:

Arrival Time	Process	Cpu cycles
0	P1	2
0	P2	5
1	P3	4
2	P4	8
5	P5	5
7	P6	4

Sub theme III:

Memory Management

A.Interpretative competences

18. Define the concept of addressing
19. What is the Mono programming?
20. What is Multi programming?
21. What are the fundamental concepts of contiguous memory management?
22. Define the paging concept
23. Define segmentation

B.Argumentative competences

24. Point out the differences between paging and segmentation
25. Why is it important to protect your memory?
26. Make a table comparing the policies of partitions of fixed size and variable.
27. What is the difference between internal and external fragmentation?
28. Describe the importance of planning the main memory
29. Why is important the virtual memory?
30. Build a comparison chart describing the functioning of page replacement policies, FIFO, LRU, Optimal and Clock
31. What is the importance of Page Faults?

C.Propositional competences

32. Building a method or function that simulates the operation of the page replacement policy FIFO
33. Find the best page replacement planning for the following applications: 2, 3, 4, 2, 5, 6, 5, 3, 6, 7, 8, 9, 2, 5, 7, 6 3, 7. using three frames of the system. Write down the changes in the frames and page faults.

Sub theme IV:

File Management and secondary storage

A.Interpretative competences

34. What is the structure of information? 35. What are the methods of access to information? 36. What is the allocation of free space? 37. What controls the space?
B.Argumentative competences
38. Point out differences between the direct, indexed and sequential information access 39. Make a chart describing hardware information 40. What is the difference between directory and file device? 41. Describe the importance of the directory tree 42. Make a comparative table of the planning algorithms disk access (FCFS, SSTF, SCAN, C-Scan)
C.Propositional competences
43. Building a method or function that simulates the operation of the disk access policy SSTF 44. Find the best disk access planning for the following applications: 28, 32, 4, 23, 51, 68, 55, 33, 63, 76, 83, 90, 27, 55, 74, 46 34, 73, used with an initial position 45. 45. Taking data from the previous year to create a new planning method of disk access with the lowest access time.
Sub theme V: **Communication processes and process control**
A.Interpretative competences
46. What is the concurrency? 47. What is a concurrent program? 48. What is a shared variable? 49. Define the concept of semaphore 50. What class is it used to carry out concurrent programs in java? 51. How do they communicate the processes? 52. How processes are they controlled? 53. What is the synchronization of processes?
B.Argumentative competences
54. Identify problems of concurrency 55. Describe the functional differences between shared variable and semaphore 56. Discuss the principles and benefits of concurrency 57. Describe the advantages and disadvantages to synchronize processes 58. Describe the structure of the execution of a thread or thread
C.Propositional competences
59. Build a model - general staff of the classes in Java for concurrent programs 60. Build a model - the general staff in Java classes shared variables 61. Design and build a Java program a computer sales store in which there are "n" providers while stocks added to the inventory between 1 and 5 teams and m buyers decrement stocks between 1 and 2 teams, in addition eventually there is a thief steals a computer.

Population and Sample

The population is made up of students enrolled in Computer Science Engineering program, Faculty of Engineering of the San Martin University Foundation. To calculate the size of the sample using the formula for finite populations or known [Berenson, 1996; page 350]:

$$n = \frac{Z^2 * p * q * N}{(N-1) * e^2 + Z^2 * p * q}$$

Where: n: Sample size; Z^2: confidence -Level of trust, p: positive variability; q: negative Variability, N: population size, (N-1): Level of accuracy, e^2: MPE (margen permited error)

Performing the calculation with a population size of 230 students (Number of students in college in the 1999-2 academic semester) in the program in half for each stock is 115, a confidence level of 95% (Z = 1.96) and a margin of error of 5%, and percentages of positive and negative variation of 50% we have:

$n = [(1.96)^2*(0.5)(0.5)*115] / [(114)*(0.05)2 + (1.96)^2*(0.5)(0.5)]$
$n = 110.446/ [0.285+ 0.9604]$
$n = 110.446/ 1.2454$
$n = 88.6831$

We conclude that we need **89** students to be representative of each population.

Information Processing

For information processing is taken into account the following:

1. Students enrolled in each semester to study the subject Operating Systems will be taken as part of the sample.
2. The instrument will be applied to every student in the sample.
3. Semesters were selected in which to apply the CAT and those without. Can be consecutive or not.
4. After obtaining the data are classified and tabulated into two groups according to use or not of the CAT.
5. Statistical procedure is used to test hypotheses.
6. The results will be displayed in graphical form.

DELIMITATION

Conceptual delimitation

The themes addressed in the experiment refer to the topics of traditional operational systems to the following special items described in Table 3:

TABLE 3. CONCEPTUAL DELIMITATION

OPERATING SYSTEM BASICS [Milenkovic, 1997] [Silberschatz, 2006] [Tanenbaum, 2003]
• EVOLUTION OF OPERATING SYSTEMS • STRUCTURE OF OPERATING SYSTEMS. Monolithic structure, hierarchical structure, Virtual Machine, Client-Server.
MANAGEMENT PROCESS [Silberschatz, 2006] [Milenkovic, 1997] [Tanenbaum, 2003]
• BASICS. Process Concept. Types of processes. Exceptions. • THE PROCESS CONTROL BLOCK (PCB). Process status. Active states. Inactive states. State transitions. Operations processes. Priorities. • PLANNING PROCESS. Planning concept. Objectives. Criteria. Measures. Planning algorithms. First come, first served (FCFS). Round-Robin (RR). The next process, the shortest (SJF). Next process, the shortest remaining time (SRT). Priority. Near the highest response rate (HRN).
MEMORY MANAGEMENT [Stallings, 2005] [Tanenbaum, 2003]
• BASICS. Introduction. Addressing. Address assignment. Storage hierarchy. Monoprogramming. The dedicated memory. Memory Division. The resident monitor. Memory protection. Address reassignment. Exchange storage. Multiprogramming. Memory protection. Contiguous fixed-size partitions. Contiguous partitions of varying size. • PLANNING MEMORY. Planning concept. Planning Policy. Paging. Memory management. Performance. Cache. Associative registers. Shared pages. Segmentation. Hardware segmentation. Rendimiento.Sistemas combined. • VIRTUAL MEMORY. Page load request. Replacement pages. Replacement algorithms. FIFO replacement algorithm. LRU algorithm. Other algorithms. Criteria for replacement of pages. Memory allocation. Location of the processes. Page fault frequency.
FILE MANAGEMENT AND STORAGE SECONDARY [Silberschatz, 2006] [Milenkovic, 1997]
• BASICS. Introduction. Information structure. Physical support for the information. Physical and logical records. Device directory. File directories. Level directories. Two-level directories. Multilevel structures. Directory trees. Other directory structures. • PLANNING DISK ACCESS. Access methods. Sequential access. Shortcut. Shortcut indexed. Space allocation. Control of space. Storage space allocation. Contiguous allocation. Linked allocation. Indexed allocation. Planning algorithms. First come, first access (FCFS) First, the lowest seek time (PBS). (SCAN) Scanning circular (C-SCAN)

Temporal delimitation

The development time of this research is for eight (8) academic semesters at the Faculty of Engineering from the second from 1999 until the first of 2003, which are approximately 128 weeks after the approval of the project.

Spatial delimitation

This research was conducted in the Faculty of Engineering at San Martin University Foundation Headquarters Caribbean, Km 8 route to Puerto Colombia.