Higher Education content learning through English EFL with the implementation of a virtual platform supported by the Education, Science, and TechnologyNetwork.

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Abstract
Purpose. *The aim of this study is toprovide pedagogical strategy in order to use the e-learning model with an OVA virtual learning object on the Moodle platform, which students develop in an active and significant way, generating academic spaces for dissemination with innovation and social impact, as intended by the Science and Technology Education Network. which permits that a team of research students have an immersion in international academic, scientific and technological sceneries throughout the writing of research articles, oral presentations of their research experiences in lectures reinforcing the English as a foreign language.*
Method:*The research is carried out from a quasi-experimental method based on a quantitative approach. The experimental and control groups are selected, which are the students enrolled in a research group of the Environmental Engineering and Civil Engineering students of the University of Santo Tomás . Group 1 or experimental is the research students group in biotechnology and environmental microbiology (BIOSIM) and group 2 or control corresponds to the research students group in structure and construction research (SIEC)*
A statistical analysis of the results of the academic performance in the Research Experiences course is carried out, which is the OVA (course in the platform Moodle) built as a tool for the experimental group, a test is made to the hypothesis raised, finally, the results are defined and the information of the development of this project is concluded.
Characteristics of the experimental group are determined, from which the information is validated and contextualized, adopting a comprehensive and interpretative approach to academic processes.
Findings:*the process of analyzing academic performance based on the qualitative variable grades is completed with the final test, which deals with all the topics worked on during the semester in an analytical way and based on the publication of successful articles on their research supported under an Education, Science, and Technology Network. Moreover, the use of English as a foreign language permits that engineering students' language abilities have increased thanks to a virtual course (Moodle course) on a platform where they could learn writing and oral communicative strategies in order to share their research experiences in a written and oral way.*
Significance:*The study is significant to implement new modification in the syllabi and curricula of universities in Latin-American, given that, the English teaching is separate of the contents teaching-learning in the superior education. On the order hand, this is significant to students who would like o write English research articles and to be immersed in international academic fields can do it since the design of the syllabi to the academic real sceneries.*
Keywords:*Communication, e-learning, strategy, pedagogy, science, technology, scientific network.*

CONTENTS
- *Projection in the formation of areas of basic science and technology in the English language.*

I. Interdisciplinary

According to(«Interdisciplinariedad, investigación-acción y trabajo colaborativo en el aprendizaje del inglés técnico», 2015) in a study carried out on the Instrumental English Director's Programme, he states that teachers from different areas and subjects have the opportunity to carry out interdisciplinary work that allows them to know and share different experiences, while students, in the case of English courses, benefit from the interdisciplinarynature,asitcreatesinthemtheneedforimmediateuseofthelanguage, while at the same time reinforcing the skills and knowledge acquired, referring to the language and the subjects of the specialty

throughout their career.

On the other hand,(González et al., 2013) points out that interdisciplinarity is one of the characteristics of Critical Pedagogy, since it guides the production of knowledge by teachers,throughcriticism,reflectionanddialecticstoapproachthecomplexityofreality anddevelopintellectual,attitudinalandmethodologicalskillsthatallowthemtointegrate disciplines, relate them to the context from a vision of totality to respond to educational and social problems. This last part is closely related toaction-research.

- *Technical language: Communicative approach of English applied to specific sciences.*

The reading of academic texts in English has become an important working tool for universityteachersandresearcherswhoseektobeacceptedbytheirrespectivescientific communitiesnotonlyintermsofupdatingknowledgebutalsointermsofdisseminating their findings nationally and internationally. Therefore, it is necessary to provide our future graduates with the necessary knowledge to adequately process the information transmittedbythetextswithwhichtheywillinteractintheEnglishcoursesandsearch for new information in order to complement their training in all areas related to their specialty (Akademos & 2001, s. f.)

Based on a communicative approach to teaching reading skills in English, the designofprogramsforthispurposewillhavetotakeintoaccountcertaindetermining factors that will contribute to their effective implementation. All these factors have a common core, constituted by the needs and interests of the students, around which other relevantfactorsgravitate,suchasthecontentsofthecourse,thematerialstobeused,the design approach, the context, the teacher's participation, among others, which will be detected through a previous analysis of these student needs and interests(Manterola & Otzen, 2015)

The concept ofintegralexperiencestakenfrom(«Interdisciplinariedad, investigación-acción y trabajo colaborativo en el aprendizaje del inglés técnico», 2015), implies a set of activities designed through an integrated, interdisciplinary and sustainable process, based on the complementarity for the achievement of combined actions and the development of the individual's capabilities in order to train future engineers capable of developing a series of skills, which will benefit the community for which they will work in the future and at the same time be at the forefront with the use of the technological resources available today.

- *Pedagogical strategy for significant training, framed in research experiences.*

Research as a pedagogical strategy has a binding impact between pedagogical practice and research, offering girls the possibility of appropriating the logic of knowledge and the tools of science with a view to society and its needs, projecting us into the significant knowledge referred to by(*The Acquisition and Retention of Knowledge: A Cognitive View - D.P. Ausubel - Google Libros*, s. f.): in order to attribute meaning to the material being learned, not only must its knowledge schemes be updated but also this knowledge must be reviewed, modified and enriched.

The teacher as a mediator is responsible for introducing the students to the world of scientists, seeking to bring them to an understanding of the world and the language of science. The conception that the teacher has of science linked to pedagogy generates fields of knowledge, this entails a change in the teacher's idea and role.(Schön et al., 1992), recognizeshimmoreasaproducerofknowledgethanasanimplementerofpre-designed processes, calling them, reflexive professionals.(Carabajo, 2008)

(*Más allá de la certidumbre: adoptar una actitud indagadora - Dialnet*, Cochran s. f.)proposed the existence of knowledge and reflections in action, which allows the integration of cognitive, emotional, theory, and practiceinexplicitandimplicitactions.Recognizingthatboththosewhoteachandthose wholearnwithinacommunityworktogeneratelocalknowledge,foreseeitspracticeand theorize about it, interpreting the conclusions ofothers.(Liu, 2018)

- *E-learning method*

Increasingly, research on education in E-Learning mode tends to favor interactive dynamics as effective methodologies for learning.

The idea of learning-by-sharing or "learning by sharing" is believed to be a critical successfactorinthee-learningprocess.Therefore,howtechnologicaltoolsareusedinvirtual classrooms, along with how teaching methodologies are put into practice, is of vital importance because this determines the occurrence of a series of cognitive processes associated with learning.(Ramírez Ordóñez, s. f.)

The process that is expected to be generated with the use of technological tools in the virtual classrooms, such as forums, wikis, among others, is to promote teaching methodologies that encourage observation, interpretation and analysis of the real world, along with the use of case studies, examples,

simulated situations, own experiences, among others. This should allow subjects, collectively, to apply the contents when reflecting on the environment around them (Judith Arias-Rueda Yolissa María Vega Castillo, s. f.).

The idea is to build learning situations in which subjects solve real-life problems associated with the field of knowledge in which they work, or which is the subject of the subject or program they study. (Grijalva Monteverde C José María Bravo Tapia & Pantoja Rangel C Ana Guadalupe del Castillo Bojórquez José Ramón Jiménez Rodríguez M C José María Bravo Tapia Agustín Grijalva Monteverde Hermosillo, 2010; *Proyecto Educativo del Programa de Ingeniería Industrial | Universidad de Boyaca*, s. f.)The idea is to motivate research, investigation and thought in ordertofavoracognitiveexchangeinthevirtualclassroom.(En et al., s. f.)Thisprocessofinter-subjective exchange occurs thanks to the communicative action of, for example, reading,writing,discussing, commenting, evaluating, giving opinions, proposing, announcing, linking, choosing, correcting or sharing, that is, actively participating in the interactive spaces of the classroom, such as the forum, chat, wiki, etc. (Ayala Carabajo, 2008)

- *OVADevelopment*

Virtual Learning Objects OVAs

In the national context, the portal Colombia Aprende(Aprende Colombia, 2013) is definedasavirtualobjectandpedagogicalmediator,intentionallydesignedforalearning purpose and serving the actors of the various educational modalities. The Colombian Ministry of National Education (MEN) defines it as all material structured in a meaningful way, associated with an educational purpose and corresponding to a digital resource that can be distributed and consulted through the Internet. (Depool, 2005)The learning object must also have a registration or metadata card, consisting of a list of attributes that, in addition to describing the possible use of the object, allow for its cataloging and exchange (Aprende Colombia, 2005)

A Virtual Learning Object OVA: Since 2006 the Colombian Ministry of National Education of several educational institutions that have been recognized nationally for their high performance in research and science, developed its definition of Virtual Learning Object as "a set of digital resources, self-contained and reusable, with an educational purpose and consisting of at least three internal components: content, learning activities and contextualization elements. The Learning Object must have an external information structure (metadata) that facilitates its storage, identification and retrieval(Ministerio de Educación Nacional, 2006 s. f.)

OVA Design

The methodology proposed by (Benítez, 2015)for the University of Boyacá (UBOA), applies the university's virtual pedagogical model to the creation of an OVA based on the questions: what does it teach, how does it teach, what and how does it evaluate and adapt a methodology for the development of an OVA in four stages: conceptualization, design, production, and distribution.(Mosquera Palacios, 2013)

Conceptualization involves designing the OVA according to the pedagogical model and generating Metadata with content, intellectual property, and application elements. The design includes three aspects: disciplinary, pedagogical, and technological. Productionincludes theselectionoftoolsanddevelopment.(*GUIDE TO MEASURING INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT) IN EDUCATION*, s. f.)Distributioncorrespondstothepublicationofthe OVA.

METHODOLOGY OF THE GUIDE
The virtual activity will follow the guidelines provided by the tools andtechnological applications to accompany the process of sharing experiences of theparticipants. **SYNCHRONOUS MEETINGS**. The first session of each module will take place in a synchronous meeting mediated by a WhatsApp group, in order to provide information. As an accompaniment strategy to strengthen the learning of both written and oral production inEnglishandtoprovidepersonalizedaccompaniment,thismeetingwillberegisteredfor later consultation on the platform. **ONLINE TUTORIAL SESSIONS**. The participants will be able to raise their concerns in the virtual classroom through the question and answer forum, the internal mail of the virtual classroom and the delivery of the learning activities to receive the respective feedback. **LEARNINGACTIVITIES.**Inthisvirtualspace, theparticipantswillcarryoutalearning activity. The execution of the activities will gradually contribute to the development of a course project that will allow evidence of the learning of the researchstudents **DISCUSSION FORUMS.** Participants make contributions to their research experiences. The forum makes it possible to work with the intelligence of synthesis that is fundamental to know the plurality of theories of the disciplines and knowledge and contributes to the formation of critical thought. **SUPPORTMATERIAL.**Thevirtualclassroomwillhavethesupportmaterialsrelatedto the activities to be developed to facilitate a greaterunderstanding. **FINAL DELIVERY**. Each participant will present the elaborated resources and the final product of the virtual space as evidence of the work done. Theprocessoffollow-upandaccompanimentisbasedontheinteractionoftheparticipants of the virtual space (tutors – research students) and these with the officials of the Virtual Education Office through the followingmeans Tutor - student/participant interaction - E-mail. - Moodle messengerservice. - Moodle LMS forum systems. - WhatsApp group service for synchronousmeetings.   The following actions are carried out by the tutor for the follow-up and accompaniment process: - To give guidelines for intervention in the argumentation, debate and other actions in the proposedtopics. - Toreviewandgiveconceptualandmethodologicalfeedbackontheactivitiessentbythe students. - Record, track, and provide feedback on partial shipments as the final workprogresses. - Evaluate the practical activities and issue a concept onit. - Formalize the result of the student's courseproject.

Table No 1 Methodology of the guide. Prepared by Becerra and Rincón (2019)

- *Anchoringmethod*

Anchored Instruction Theory

The 'anchor' refers to the location and selection of the theme concerning a context, problem or situation that is evident in everyday life. Through the use of technological tools, the creation or replication of the context is allowed in order to generate and obtain satisfactory learning. (Dochy et al., 1999)

The role of any functional approach is to practice the common language until you become an expert, mainly in its oral form. Most curricula are aimed at bringing the student into direct contact with the spoken language. This approach is further classified into four methods which will be briefly described below(González et al., 2013)

Didactic exercises for oral *expression.* The following table provides information on the types of exercises for reinforcing oral expression:
Technique

1. Dramas

2. Stagings

3. Role-playinggames

4. Simulations

5. Writtendialogues

6. Language games

7. Teamwork

8. Humanistictechniques

Type of response

9. Repetition

10. Fill in theblanks

11. Giveinstructions

12. Problem-solving
13. Whirlwind ofideas

Material resources

14. Stories andTales

15. Sounds

16. Pictures

17. Test,questionnaires

18. Objects

Specific communications

19. Exhibition

20. Improvisation

21. Talking on thephone

22. Readingaloud

23. Video and audiotape

24.   Debates anddiscussions

Types of speaking exercises

          (Martí Llobet & Cassany, 1998)The mere fact of identifying which is the least developed skill, in this case speaking, is not very useful. It is for this reason that greater emphasis will be placed on the didactic techniques that the teacher can use in the classroom to develop this important skill.Inthiscase,thestudents'investigativeexperiencesthroughtheirresearch groups allow them to concentrate significant learning through English with a specificpurpose(Akademos & 2001, s. f.)

(Kymes, s. f.), in turn, invites the use of thinking aloud as a technique by which the individual expresses his thoughts orally during the exercise of his reading activity. Also, (Jahandar et al., 2012)considerthatthistechniquecontributestoimproving the cognitive processes of the learner and allows him/her to connect meanings and understandings with thetext.

II. Methodological design

          The research is carried out from a quasi-experimental method based on a quantitative approach. The experimental and control groups are selected, which are the students enrolled in a research group of the Environmental Engineering and Civil Engineering students of the University of Santo Tomás. Group 1 or experimental is the research groups in biotechnology and environmental microbiology (BIOSIM) and group 2 or control corresponds to the research groups of students in structure and construction research (SIEC) AstatisticalanalysisoftheresultsoftheacademicperformanceintheResearchExperiences course is carried out, which is the OVA built as a mediating tool for the experimentalgroup, a test is made to the hypothesis raised, finally, the results are defined and the information of the development of this project isconcluded.

Characteristics of the experimental group are determined, from which the information is validated and contextualized, adopting a comprehensive and interpretative approach to academic processes.

Quasi-experimental method

Thismethodisusedwhenitisnotpossibletohavecontroloverallsituations,butthe intention is to maintain as much control as possible. In this case, the random selection ofthesamplecannotbemade,thatistosay,itwillbebasedonagroupthathasalreadybeen formed, in the authors' words, they are intact groups, according to(en Roberto Hernández Sampieri et al., 1991)

Quasi-experimental designs also deliberately manipulate at least one independent variable to see its effect and relationship to one or more dependent variables, only they differ from 'true' experiments in the degree of certainty or reliability that can be had about the initial equivalence of groups. (*La investigación cuasi experimental - Psicología UNED*, s. f.)

Hypothesis

Quasi-experiments study the causal effect of the independent variable by precisely controllingforextraneoussourcesofvariation,researchhypothesesarecausalandnotmerely associative. The following hypotheses are putforward:

- **Working hypothesis:H_1**

By using ICT mediations such as OVAs in the Research Experiences technical English preparation process, *at least* 55% of the students in the Biotechnology and Environmental Microbiology (BIOSIM) research group of stuents can expose and write scientific texts in English with more fluency and skill.

- **Null hypothesis:H_0**

By using ICT mediations such as OVAs in the Research Experiences technical English preparation process, *at most* 55% of the students in the Biotechnology and Environmental Microbiology (BIOSIM) research groupof students can expose and write scientific texts in English with more fluency and dexterity.

Quasi-experimental model

Being a linear model $y=1/m(x_1+x_2+\cdots+x_{(m)})$ gives values of [0.5] is scaled down, meaning that the scores start to be quantified from zero and their maximumis5,ontheotherhand, theslopeofthelineshouldbe1/mwheremisthenumber of grades taken into account to calculate theaverage.

Definition of variables

The independent variable is the *OVA* and all processes carried out from the platform.*The dependent variable* is the results obtained by the learning process of the integral calculus course, by the Schoology platform (OVA).

Levels of manipulation of variables

Control and experimental group

Instruments for analyzing and measuring variables

Control and experimental group

Instruments for analyzing and measuring variables

Information	Source of information	Harvesting technique
Descriptive: Interpretations and analysis of experiences, perceptions and values in which the content will be deepened.	Students of environmental and civil engineering from the Universidad Santo Tomás registered in the research nurseries and selected as a control and experimentalgroup.	Interviewed Field Diary ProfileeditedintheOVAofthe course in Research Experiences.
Quantitative: Measure quantifiable values, which can be graded, and percentages of academic performance,	Industrial engineering students from the University of Boyacá enrolled in the integral calculation courses and selected as a control and experimental group.	Diagnosticandfinaltestscores. Qualified activities from the OVA orientation of the course. Qualifications of activities carried out in attending classes.

Table No 2. *Information collection instruments. Prepared by Becerra and Rincón (2019)*

Sample, control and experimental group
Students of environmental and civil engineering at the Universidad Santo Tomás registered in the research group of students.

Information analysis
Statistical analysis is performed from SPSS Statistic v. 21software of the average of the grades obtained by each student in both research groups.
And hypothesis testing for proportion.

Implementation of instruments
The instruments are implemented as follows:
Teachers from the control and experimental groups are interviewed, as well as a focus group with students from the experimental group.
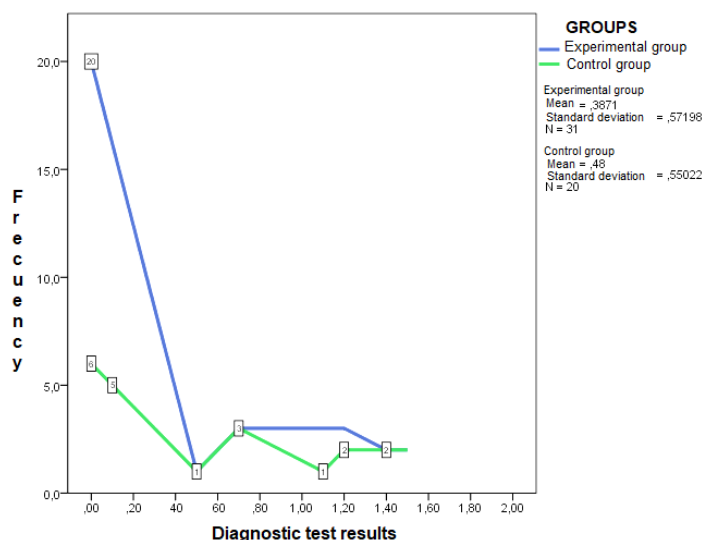Field journals of the classes where the topics for this research were addressed were prepared and mediated by the ICTs.
In order to take into account every moment of the process and thus be able to infer in the results of the research.

II. Results

Academic performance
Diagnostic test results

Chart No 1. *Diagnostic test. Prepared by Becerra and Rincón (2020)*

The Diagnostic test is carried out in the first week of class, and its purpose is to analyze the basic execution of the prerequisites to be able to take the course, both in its research foundation and in the fluency of the English language. The previous allows us to see that the groups are approximately at the same level when initiating the course, since it is not possible to deduce on the possible causes of the loss of the examination, this subject would have to be treated and investigated with greater depth.

Intermediate test results
It should be noted that the academic performance of the control group keeps its academic process stable and regular.
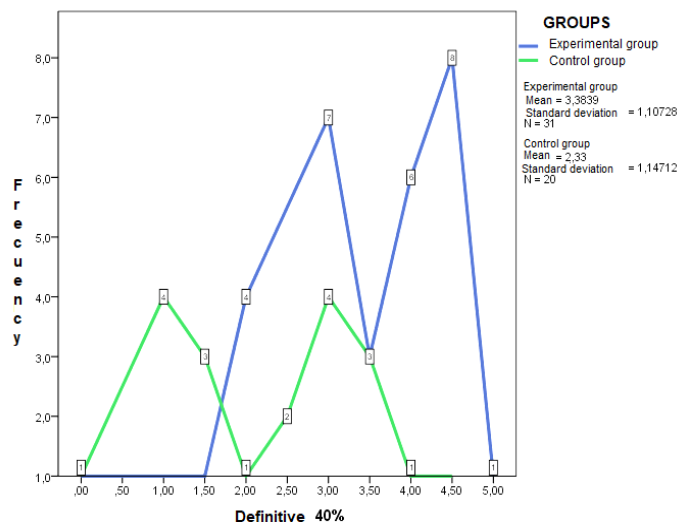

Chart No 2. Intermediate test. Prepared by Becerra and Rincón (2020)

This exam compiles the main topics worked on during the course, leaving the practical part to be worked on where the final results will be evident.

The progress made by the experimental group in implementing the activities mediated by the OVA in the course can be seen.

Approximately 65% of the control group and approximately 28% of the experimental group lose this test. The difference between the two groups is remarkable since there is a notable difference in favour of the expected performance in the experimental group.
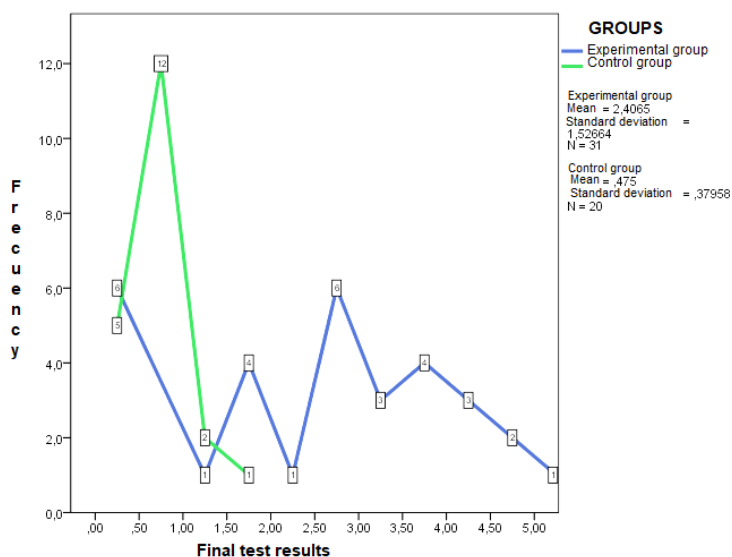
Final Test Results

Chart No 3. The final test of the groups. Prepared by Becerra and Rincón (2020)

Finally, the process of analyzing academic performance based on the qualitative variable grades is completed with the final test, which deals with all the topics worked on during the semester in an analytical manner and based on the publication of successful articles on their research.

This test was conducted in the last academic week with the students who attended the class that day.

The average result of this test confirms the analysis of the process during all the terms of the course and demonstrates that the effect caused by the ICT mediation worked from the Moodle platform has a positive result in the measurement of the academic performance since the experimental group that was affected with this mediation obtained a very outstandingquantitative academic performance compared to the quantitative academic performance of the control group.

Hypothesis testing

From historical information on the work in this series of courses, it is known that at most 55% of the students can produce texts in English and 25% publish or exhibit them at a scientific event. However, the results of the academic performance of the experimental group using ICT mediations, since the OVA course, Research Experiences was 77.5% of students who approved the proposed activities and who also managed to produce an article and present it at the event of the Second Meeting of the Science and Technology Education Network, therefore, only 22.5% failed or met the objective of the course.

It is intended to test with a significance level of $\propto= 0,05$ that,
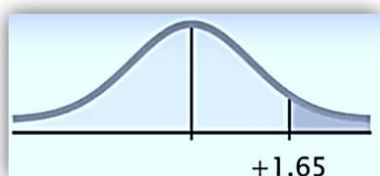
$H\_0:P\leq55$

$H\_1:P>55$

Assumptions:

$P=55$

$n=31$

$\hat{p}=77,5$

$\hat{q}=22,5$

$\propto=0,05$

Critical Statistician $Z0,95 = 1,65$ the shaded right-hand tail corresponds to the rejection area and unshaded to the acceptance area.

Graphic n°_____
Test statistic

$$Z = \frac{\hat{p} - P}{\sqrt{\frac{\hat{p}\hat{q}}{n}}} = \frac{77,5 - 55}{\sqrt{\frac{77.5*22,5}{31}}} = 3$$

Equation n°1   Test Statistic.

Therefore, it is rejected H0 in support of H1 demonstrating that by using ICT mediations in the learning process, from the Research Experiences course for research group students from the environmental engineering and civil engineering faculties of the Saint Thomas University section, students can expose and write scientific texts in English with more fluency and dexterity approving the proposed activities by more than 55%.

The results presented above help to answer the question that was posed at the beginning of the research: How can oral and written English skills be strengthened through the e-learning method to share research experiences in academic settings from the Science and Technology Education Network?

III. Conclusions

From the approach of the state of question or of the art and the theoretical framework it was possible to establish the conceptual references that supported the investigation, the categories of analysis were raised which were rough: ICT mediations, pedagogical practices and evaluation from the learning process, OVA design, quasi-experimental designs.

The ICT mediation was designed in the area of production of scientific texts and exhibition of research as lectures in the English language in the course of Research Experiences; the platform used was Moodle with a series of resources that allowed students to interact with the object of study.

The hypothesis worked out in the research was demonstrated, showing that the academic performance improved and that the students managed to expose and write scientific texts in English with more fluency and dexterity, approving the proposed activities by more than 55%, exceeding the historical data with a result of 77.5% when mediated by ICT.

From the diagnostic and final tests, the progress in the learning process of the experimental group is evidenced, making the independent variable OVA obtain results in the dependent variable from the various activities of the ICT mediation.

The effects of the ICT mediation exceeded the expected results in the research process since it not only allowed the academic performance to improve in a great percentage but also directed the student's work with an organized, systematic and participative study method that resulted in good performance and interest in generating learning; furthermore, it led to the reflection of the development of these strategies as innovative proposals in the institutional reforms.

The Science and Technology Education Network integrated the students from the research students into the scientific processes and allowed it to be the initial platform for the II Meeting of the Science and Technology Education Network, where the students made their presentations of the research work in the research students in the English language.

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