RESEARCH GUIDING PLAN

CETYS
UNIVERSITY

Mexicali, Baja California. October 2005 / September 2006

INDEX

Research Guiding Plan from CETYS University

The formulation of the Plan that CETYS University considers to develop in a complete and systematic way is widely supported on its Statute's normative basis, its Mission, the Educational Model, and the CETYS University Plan 2010 that indicate the direction where the institution aspires to reach as far as educational matters and research is concern.

The first chapter establishes the philosophical and educational principles that constitute CETYS University as a higher education and research institution. Likewise, it describes how important is the scientific and technological research, not only in the educational sense, but also in its commitment to contribute with alternatives for the solution of the social and economic problems that surround it. To endorse this understanding, scientific contributions carried out at CETYS University are presented.

The second chapter deals with the components that define the Guiding Research Plan. Firstly, it explains how CETYS University understands the scientific and technological research with the intention to organize the corresponding activities. After talking about the objectives this Plan aims at, it describes the programs and subprograms where later on they are grouped in lines of inquiry and it points out the participation of the academic areas in the subprograms. Finally, it describes other operating aspects needed to carry out this Plan.

I. CETYS University

I.1 What is CETYS University

CETYS University is a non-profit private institution created under the auspice, promotion, and sponsorship of the Northwest Educational Institute Partnership (Instituto Educativo del Noroeste, A.C. Its acronym in Spanish is IENAC), and that operates under the Official Recognition Validity of the Department of Public Education No. 21414 from November 7, 1974. The Official Recognition Validity of Studies from the Government of Baja California from October 10, 1983, and the Agreement of Institution of Excellence from October 27 1995. According to its General Statute, CETYS University is the means where by IENAC complies

with its objective to initiate, promote, foster, stimulate, sponsor or directly manage, and lead all kinds of educational and scientific research activities, and the diffusion of culture.

CETYS University is made up of three campuses located in Mexicali, Tijuana, and Ensenada. It has bachelor and postgraduate programs shown in the appendix of this Plan.

One of the concerns of CETYS University, that it is constantly there, is clearly stated in its Mission: the purpose to contribute to the formation of persons with the required moral and intellectual capacity to help in the economic, social, and cultural improvement of the country. Likewise, to achieve it, CETYS University systematically promotes:

- The formation of character
- The general cultural formation
- The scientific formation
- Teaching
- Research and
- The extension of culture

For the education of the persons in a complete way, CETYS University has orchestrated an educational model based on the philosophical, pedagogical, and the institutional principles:

- To Learn knowledge
- To learn to develop abilities and skills
- To learn to learn attitudes, habits, and to develop creativity
- To learn to live together and to give the right dimension to truth, freedom, good, beauty, spirituality, justice, and the rest of the related values
- To learn to be and to be well
- Humanism and values
- Enterprising attitude
- Research culture
- Information culture
- Work connection
- Continuous improvement
- Internationalization, among others that derive from the CETYS University mission.

CETYS University has as a purpose that the members of the teaching body are persons with excellent training in their degree, with a high sense to excel, and that they are not only convinced of the principles that have been previously said, but also that they have the capacity to transmit them to their students.

The laboratory and workshop facilities that CETYS University currently has in their three locations, as well as the academic programs given at the bachelor and postgraduate levels, give a general overview of the direction and capacity that the institution currently has to develop the educational, scientific, and technological activities (see attachment).

I.2 Research justification in CETYS University from its educational model and surroundings

Research in CETYS is placed within its Educational Mission and the scope that determines its Institutional Vision. The research that CETYS carries out should be headed towards the search and generation of knowledge through theoretical, methodological, technical, and practical instruments that explore and get deeper into the real and objective phenomenon to transform them into a benefit for man.

In a wide overview, it is determined in the CETYS University Mission that research is directed towards the study of educational problems of its own. Also the detection of the human resources needs that the community demands, so in that way it can establish the educational options that help to satisfy them. Research in specific fields of teacher specialization will be fostered through special programs that are unique to each project.

To be more certain in the normative principles that relate to the importance that is given to the development of research: the CETYS University Mission establishes that research programs aim to generate scientific, technological, and development knowledge to solve the regional, national, and international problems. The CETYS University General Statute states that it must have a Guiding Research Plan, and that it will be provided with a complete evaluation system (where a Research Commission will participate). Besides, the

same statute establishes the President's responsibility for the preparation of such plan, its updating, and the assurance that the assigned personnel and budget be consistent with the plan's objectives. These objectives will be

instrumented through projects grouped in lines of inquiry. In a particular way, what is stated in the CETYS 2010 Plan will be considered as far as one of the obtained results from the experts: to give an increasing emphasis to research and development that are tightly joined to the companies and industries as well as projects of social interest and community value.

I.3 General research background at CETYS University.

The scientific research at CETYS University has been formed in an isolated way, but it has not been neglected. This can be seen ahead on the contributions for the last five years. At the rectory level and through its headships' support (Educational, Curricular Development, Institutional Efficiency, and Marketing) there have been study developments of the institutional and educational types. For example, the Institutional Effectiveness Headship coordinates the institutional evaluation and planning processes as well as the procedure analysis to determine the degree of efficiency and effectiveness. It is also responsible for the coordination of the institutional crediting processes, of national and international programs, and the handling of basic statistics of CETYS University.

The Educational and Curricular Development Headships have fostered educational research through different mechanisms. It stands out the methodological approach for the revision and restructuring of the study plans, and the follow-up to the educational programs specially the ones that came out of the 2004 academic reform. Other work aspects are the formation and teaching practice from where there have emerged studies (especially in a qualitative style) that have been presented in forums and conferences. Likewise, the connection of these headships at a rectory staff level with the Social Sciences and Humanities departments has allowed the development of a line of inquiry in the field of values. The editorial collection of Social Sciences is the outcome of these efforts.

On the other hand, the Marketing Headship is in charge of preparing the academic promotion, institutional image promotion, market detection needs, and market research programs among other responsibilities.

In the next chart there are studies carried out in the past five years corresponding to the institutional type:

Institutional Research	
Study	Responsible
Supply and demand of the private higher education in Baja California.	Jorge Rocha.
A study and diagnosis of the educational supply and demand at the higher level in the state of Baja California, 1996-2000.	Jorge Rocha & others.
IV Study of graduate follow-up	Jorge Rocha.
Study of the performance evaluation of the professional graduate.	Jorge Rocha, Cynthia Ibarra.

The **Extension and Liaison Headship** has traditionally maintained a constant communication with the productive, service, and governmental sectors to know their needs and to give them the required services. In the following chart there are studies carried out during the last five years:

Study	**Responsible**
Regional development plan for Tecate: "Tecate in search of opportunities."	Dr. Marco A. Carrillo, J. Samuel Díaz, Eduardo Avila.
Strategic study for the working and productive development in Mexicali.	Dr. José Luis Molina, J. Samuel Díaz.
Public safety diagnosis of Baja California.	Dr. Marco A. Carrillo, Araceli Almaraz, J. Samuel Díaz.
Strategic action plan: "Mexicali 2020."	J. Samuel Diaz in co-participation with other researchers.
Local government forum about public safety in Tecate.	Dr. Marco A. Carrillo, Emanuel Mendoza.
Local government forum about public safety in Rosarito, B.C.	Dr. Marco A. Carrillo, Emanuel Mendoza.
Indicator system for the goals of the local government development plan, 1999-2001. XVI Mexicali City Hall.	Carlos Castellanos.

Diagnosis to increase the competitiveness of the micro, small, and medium company in Tecate, B.C.	Araceli Almaraz.
Master plan for the tourist development of Rosarito, B.C.	Araceli Almaraz, Eduardo Avila.
Public safety diagnosis update of Baja California.	J. Samuel Diaz.
Marke study of continuous education at a technical level.	Juana J. Solis (not finished)

Another interesting effort on research consisted in the formation of students in the technological research through the **Manufacturing Integration Center** that is dedicated to offer technological innovations and support to the industrial sector. In the following chart, there are projects developed in this Center on 2002 with the purpose to show the technological capacity in the engineering area.

- Strategy design for the integration of the manufacturing systems at the Zahori plant, Mexicali.
- Sales and administration strategy designs in Desert Foundry (Fundidora del Desierto), Mexicali.
- Redesign, integration, and transference from the TEMCO chimney plants in Tennessee and Riverside Ca. to Mexicali (TEMCOMEX).
- Redesign of plant and processes at Paulson, San Luis R. C., Sonora.
- Assessment on quality procedures in the captaincy ports of the Transportation Department (SCT abbreviation in Spanish) in Baja California.

Engineering has carried out research and technological development directed to the industry in the area of metal-mechanics where students have participated in: technological innovations of a competition car, design and construction of a foundry furnace, and a project of a mechanical arm among others. In addition, in this area we are developing the following projects by Dr. Enrique Rodarte:

- Correlation between the acoustic field and the fluctuating forces produced by the vortexes generated in short cylinders when they are subject to turbulent crossed flows inside rectangular ducts.

- Scale model of a thermal warehouse system to verify the establishment of thermo climates in a stratified water tank and its behavior with different diffuser systems and Reynolds numbers.

- Effect studies on elimination water vapor system in the capacity of vacuum cooling systems.

In the field of **Social Sciences and Humanities** there have been projects carried out, or are in the execution process at the different CETYS University establishments. For example:

- Design, development, and standardization of a computerized instrument to determine the knowledge profile of the graduate (its acronym in Spanish is PERCOBA) in the high medium level. Science Teacher (ST) Luis Alberto Linares.

- Analysis of conflictive neighborhoods in the city of Mexicali. Dr. Alberto Garate and ST Luis Linares.

- Project: design and functioning of a value system of CETYS University. Research report in progress. Rectory.

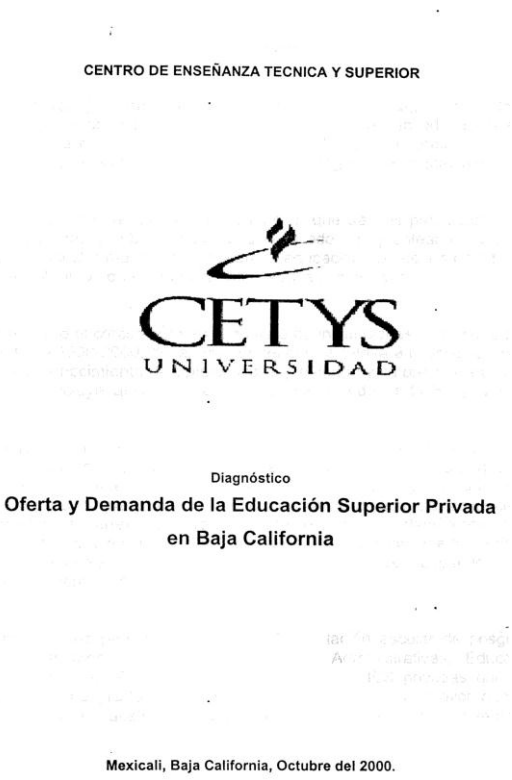
- Historical type research about the 40 years of life of CETYS that concluded with a publication. General Coordination. Dr. Alberto Garate.

- Distribution of the income and poverty in Latin America during the neoliberal stage: the cases of Mexico, Brazil, Argentina, and Chile.

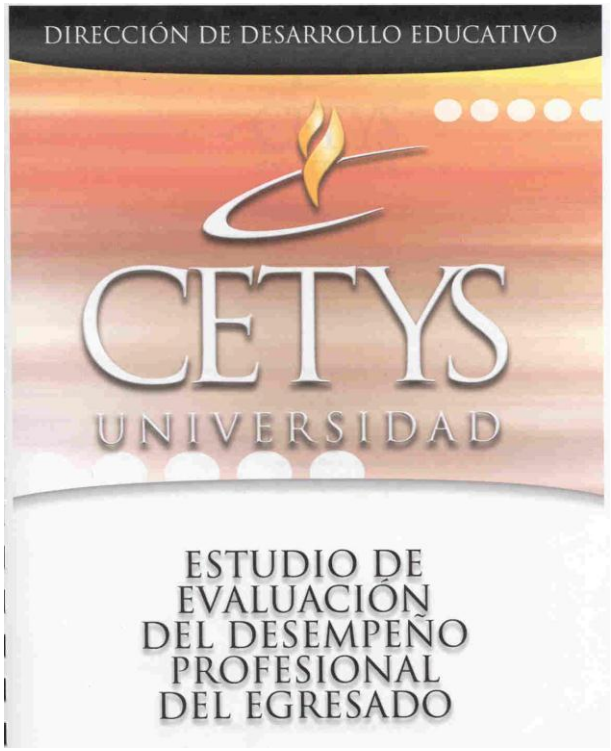
- Understanding the environmental culture and sustainable behavior in the Mexicali-Calexico region. Developing environmental education products to improve air quality. ST Rosa Maria Lamadrid.

The previous mentioned works do not correspond to all the ones CETYS University has carried out, but are only a sample to let the people know the kind of investigations they have carried out.

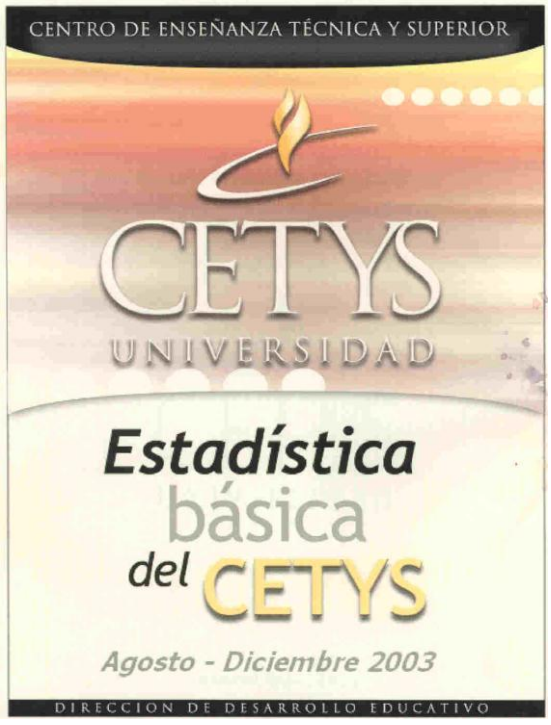
From the efforts that have been developed in the institution concerning research, some have ended in the following publications:

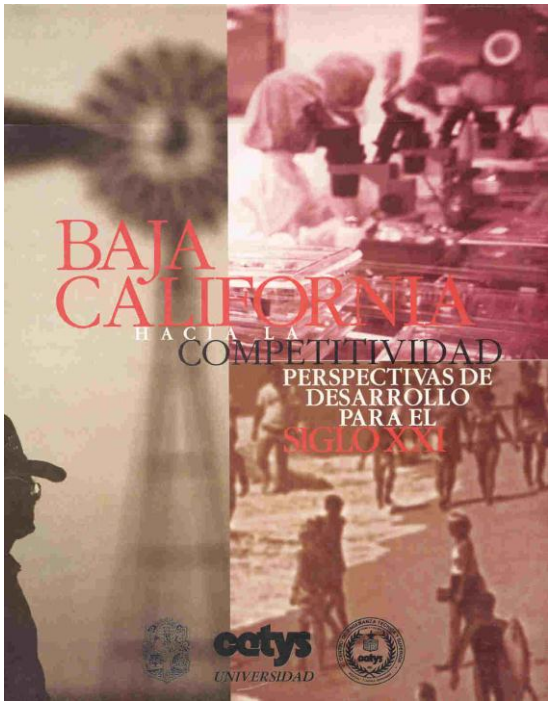


Higher and Technical Teaching Center
C E T Y S University
Diagnosis
Supply and Demand of the Private Higher Education in Baja California
Mexicali, Baja California, October, 2006



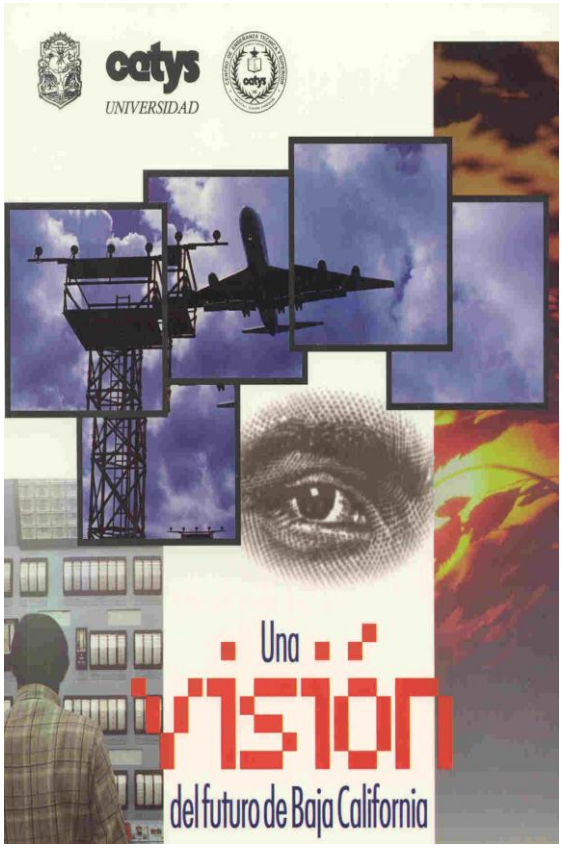
EDUCATIONAL DEVELOPMENT HEADSHIP
CETYS UNIVERSITY
STUDY OF THE PERFORMANCE EVALUATION OF THE PROFESSIONAL GRADUATE

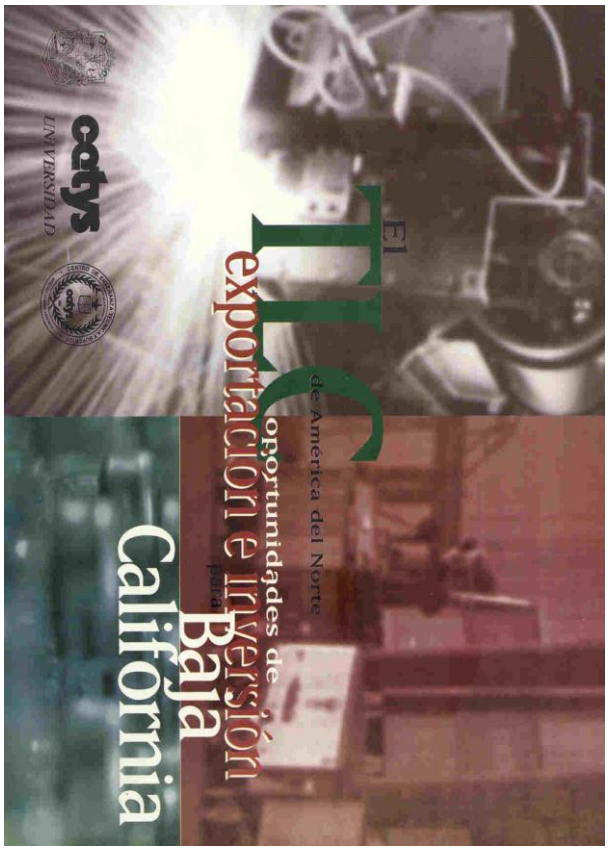




HIGHER AND TECHNICAL TEACHING CENTER
CETYS UNIVERSITY
Basic Statistics of CETYS
August – December 2003

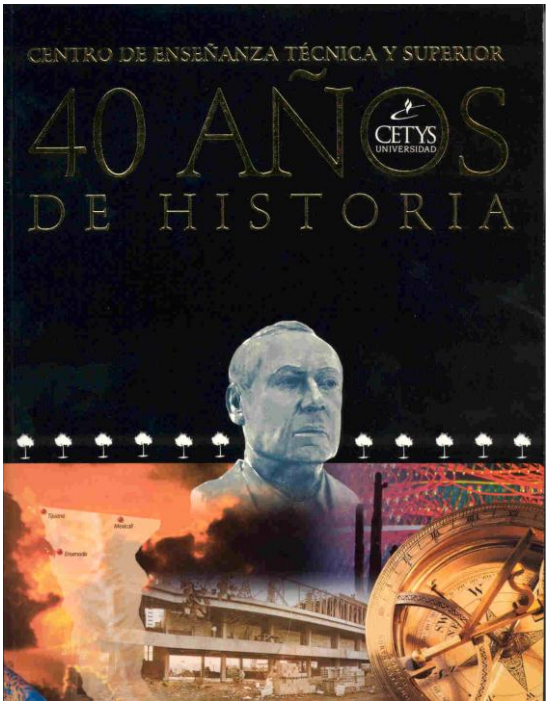
BAJA CALIFORNIA
TOWARDS
COMPETITITVENESS
DEVELOPMENT PERSPECTIVES
FOR CETYS UNIVERSITY



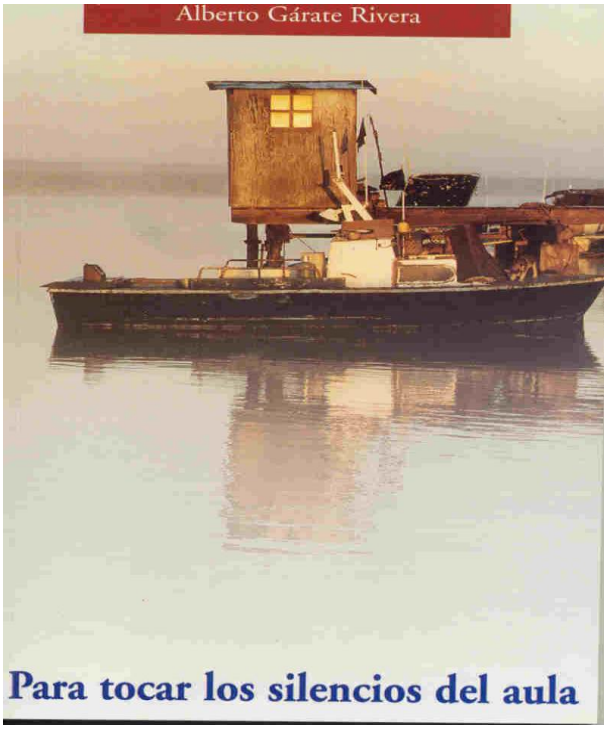


CETYS UNIVERSITY
A VISION OF THE FUTURE OF
BAJA CALIFORNIA

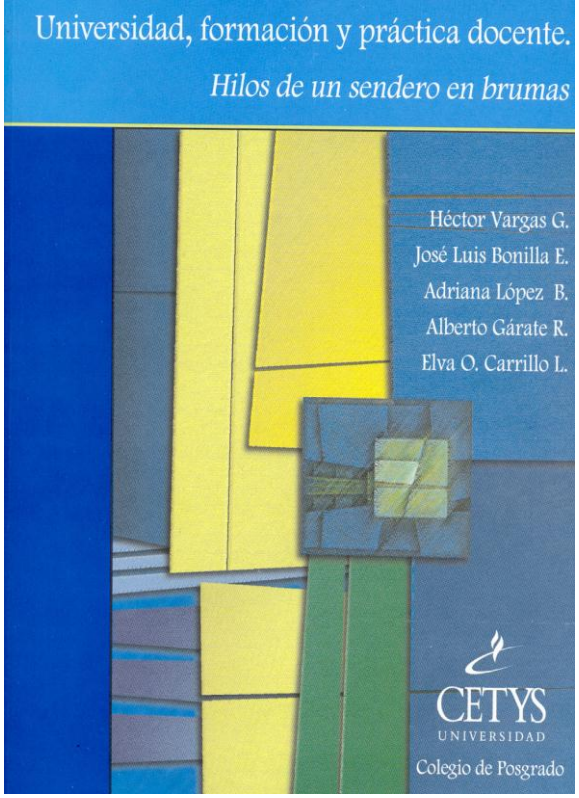
NAFTA
OPPORTUNITIES OF EXPORTS AND INVESTMENT
BAJA CALIFORNIA CETYS UNIVERSITY

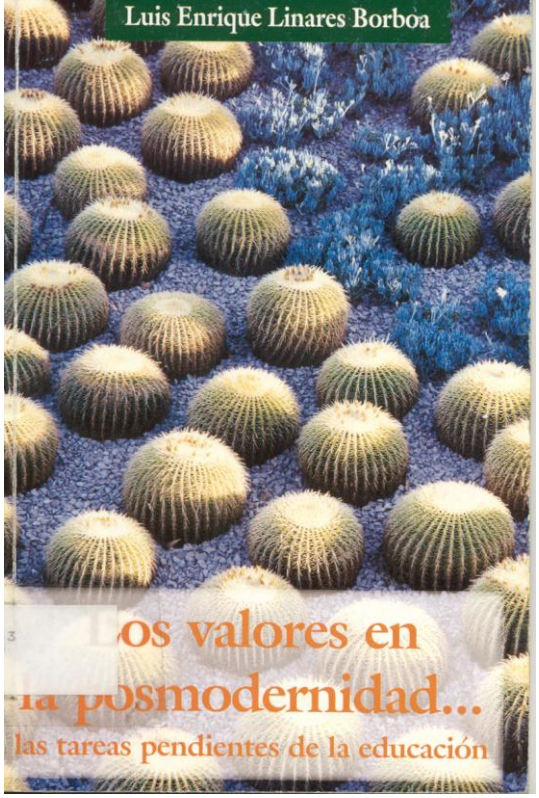


HIGHER AND TECHNICAL TEACHING CENTER
40 YEARS OF HISTORY



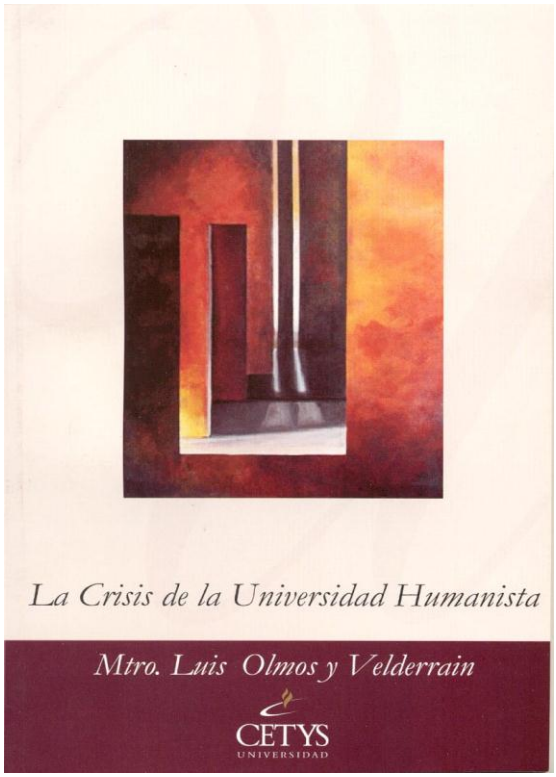
To touch the silences of the classroom
Alberto Garate Rivera





University, formation, and teaching practice
Threads of a path in mist
CETYS UNIVERSITY
Postgraduate College
Hector Vargas G.
Jose Luis Bonilla E.
Adriana Lopez B.
Alberto Garate R.
Elva O. Carrillo I.

The values of post-modernness. . .
The pending tasks of education
Luis Enrique Linares Borboa



The Crisis of the Humanistic University
CETYS UNIVERSITY

In 2004, CETYS University achieved its registration before the National Registration of Technological and Scientific Institutions and Companies (its acronym in Spanish is RENIECYT) of the Science and Technology National Council (its acronym in Spanish is CONACYT). The Council allows the request of funds to carry out research projects like sectoral, mixed, international cooperation, and institutional funds.

II. Guiding Research Plan

II.1 Conceptual framework

The technological development and research constitutes an instrument that the countries have to contribute to the economical and social welfare progress. There are evidences of the connection that exists between the research investment and the technological and economical development of a country. The educational institutions carry out an important role not only in the formation of human resources of high level, but also concerning technological and scientific research that contributes to the solution of problems that society demands; not only local, its ambit can project to the regional and national level. There are no boundaries for science and technology.

Due to its nature, research for CETYS is of the following kind: **Basic** because it is the intellectual element with what the science man in search for knowledge possesses and it is a main source for the solution of specific problems that will give as an outcome to know the behavior that surrounds us in the broadest sense; and of the **Applied** kind because it is defined in specific solutions.

Both kinds of research, pertaining to their nature, are not separated from each other, but they share feedback and evolve. From this, we obtain technological development and technological innovation that are important products that propitiate the existing knowledge structuring so it can be used in generating social welfare as well as in the economic and productive sectors. As we mentioned before, the creation of scientific and technological knowledge is an element that directly affects in the socioeconomic development of the countries.

The scientific applied research in CETYS has as a starting point the thematic that poses the economic and social development region.

As a complement to the previous concepts, and to show a broader spectrum, it is convenient to consider what the technological scientific activities that CONACYT establishes for their financial support.

CONAYCT contemplates research and experimental development as the systematic and creative work carried out with the purpose to increase wealth of knowledge, and its use to come up with new applications. It includes the following categories: basic research, applied research, and experimental development: the same that were previously stipulated, but it also considers other categories like scientific and technological activities:

- The education and the technical and scientific teaching (includes the concept of high-level formation of human resources). CETYS University is formed by its educational, bachelor, postgraduate, and technical programs.

- The technological and scientific services include the activities related to research and experimental development, and contribute to production, generation, diffusion, and application of technological and scientific knowledge. For example:

a) the ones rendered by the information and document centers, and the centers devoted to the organization of scientific congresses,

b) the systematic activities that include translating and preparing books and technology and science periodic publications,

c) the gathering of information about the human, social, economic, and cultural phenomenon,

d) essays, standardization, metrology, and quality control,

e) assessments for the application of scientific, technological, and negotiation knowledge,

f) activities related to patents and licenses among others.

II.2 Research Objective

The aim of the theory, educational, and applied research at CETYS University is the enrichment of the body of knowledge of each one of the disciplines. In addition, to keep a permanent connection and feedback with society through education and teaching, diffusion activities, spreading, and means of dissemination of results and products that will be directed to different sectors of society.

To achieve this general purpose is necessary to contemplate the following specific objectives:

- To participate in the cultural, economic, and social development of the State of Baja California, and of the country.
- To foster, promote, finance, and organize the development of research projects based on the four subprograms that have been established.
- To create groups and research centers that brings about the analysis and studies of themes of institutional interest.
- To involve the students and teachers in research projects.
- To publish the research carried out, and if need be to do all the paperwork to get the respective patent. In general, to carry out the diffusion and dissemination of the results of the research to society in general.
- To foster the exchange of researchers with other universities and research centers in a national and international framework. Likewise, to participate in the different networks of investigation in the disciplines of interest as well as the research that the companies carry out.
- To participate in projects supported by regional, national, and international organisms.
- To search improvement and technological development alternatives in a permanent way with the productive, social, and governmental sectors.

II.3 Research programs and subprograms

The Research Guiding Plan is outlined under two great schemes that translate in the following programs: **Academic research** (its acronym in Spanish is PIA) and **Institutional Research** (its acronym in Spanish is PII).

It is from these two great schemes that the research activity is guided in four more subprograms that are specific, and that by their nature they indicate the different ownership and competence ambits as the following shows:

Educational and institutional research Program (PII)

- Institutional Research Subprogram

- Educational Research Subprogram

Academic research Program (PIA)

- Scientific Research Subprogram
- Development Skills for Research Subprogram

The breakdown in subprograms facilitates the coordination and handling of the necessary information to promote the Institutional and Academic Research Programs as well as the information generated by the same activities of research. These subprograms consist of the following:

Scientific Research Subprogram. It mainly considers the basic and applied research even though the possibility is still open for the experimental and technological development, and for the technological and scientific services. A classification handled by CONACYT.

Institutional Research Subprogram. Its end is to support the decision-making and the planning and evaluation of the institution, and in this way determine the factors that affect the operation and the educational results of the institution.

Educational Research Subprogram. Its direction is towards the exploration, evaluation, and stimulation of new forms of work in the process teaching-learning. It is fundamental the participation of the academic organs specially the professors because it implies that they generate new knowledge and educational processes. Likewise, the fact that the Educational and Curricular Development institutional headships get involved must generate the conditions so the research can be systematic and systemic. In such a way that it affects the education given in the three campuses of the CETYS system.

Research Development Skills Subprogram. The key role of the CETYS professor is obvious in this aspect. The design of the study plans as much as the development of the subject programs aims to explicitly promote the development of the students' skills in the research field. Different products, fruit of the learning activities, that are carried out inside as well as outside of the classrooms can strengthen this subprogram.

In the following chart, we have the institutional participation in the activities of different subprograms mentioned before. It is not limited because depending on the needs, capacities, and the persons' experiences they could be part of another scheme.

Responsible area	Scientific research	Development of research abilities	Institucional research	Educational research
Postgraduate college	**R**	**R**	**P**	**R**
Schools: • Engineering • Business and administration • Social Sciences and Humanities	**R**	**R**	**P**	**R**
High School		**R**	**P**	**R**
Institutional units (Educational Headship, Insitutional Efficiency Headship, Curricular Development Headship, Marketing Headship)		**P**	**R**	**P**
Extension and Liaison Headship	**R**	**P**	**P**	**R**

Note:
R it implies a direct responsibility of the area in the development of research projects of these programs.
P it is talking about and indirect intervention.

II.4 Institutional participation in the research subprograms

II.4.1 Scientific Research Subprogram.

Among the main activities of the universities, we find the search of innovative methods and knowledge through **research** works. This is the way CETYS University has as a goal to contribute to problem solving that affect the economic and social development of the region. To achieve these purposes, CETYS University supports **research and technological development projects** that allow the identification of problems and their solution through

knowledge generated by researchers of a degree that are experts in the specific problem area. Likewise, the participation of productive and social sectors is achieved. It promotes and fosters the regional collaboration by favoring the development of regional, national, and international research projects. Through CETYS University research, it aspires to be a space of reflection where researchers, public servants, social leaders, and entrepreneurs are integrated with the idea to study public and private topics of interest.

Postgraduate College

The research works, mainly applied research, are done at the Postgraduate College that has tenured researchers, associates, assistants, and guests as well as administrative and technical support personnel. Also equipment and advanced means of communication and computing. Nonetheless, research is also developed in other academic units as it was previously mentioned.

The research project results or progress that are carried out in CETYS University are promoted by the Postgraduate College for its popularization or diffusion in congresses, seminars, national and international periodic publications, and textbooks.

The research proposal projects, as well as the results, are evaluated firstly through the Postgraduate Academic Coordinators in their respective areas of specialization. Once they and the responsible researcher have approved the investigation, they recommend such work. Once the research is recommended, it is turned over to the Institutional Research Commission. This Commission is made of the Academic Vice Chancellor, the Administrative Vice Chancellor, the Educational Director, the Institutional Effectiveness Director, the Curricular

Development Director, the Marketing Director, the directors of the Colleges of Engineering, Business and Administration, Social Sciences and Humanities, Postgraduate, the academic directors of each campus, and the Extension and Liaison Director of Mexicali.

Extension and Liaison Headship

Starting from the point of consulting the productive, governmental, and educational sectors of the region, a vision has been defined for the development of the State of Baja California in a medium and long-range period.

This vision is reflected in the Entrepreneurial Development Policy (EDP) that constitutes a key factor for the strategic promotion of the State of Baja California.

The EDP supports itself in the following terms and is directed to achieve a long-term harmonic development for the state:

1. To increase entrepreneur competitiveness.
2. To redesign the value chain.
3. To develop productive clusters.
4. To increase the benefit of the items made or produced in the state.
5. To promote our values to guarantee an ethical behavior in our companies and in our society.
6. To raise the standard of living in the state.

In the framework of the terms of the EDP, the higher impact vocations were defined in the state. These vocations are divided in:

- Reasonable vocations
- Vocations to promote
- Vocations to incubate

As a result of the economical, labor, and entrepreneur analysis, up to now the following clusters or entrepreneurial chains have been identified:

1. Tourism
2. Wine-producing
3. Food and agriculture industry
4. Fishing and aquiculture
5. Biotechnology
6. Information technologies
7. Electronic
8. Automotive
9. Medical products
10. Medical services
11. Energy
12. Plastic
13. Wood and furniture
14. Aeroespace

According to the connection background and the current State situation as far as its economic development, the areas that CETYS University has the interest

to contribute to develop applied and assessment research projects are the following:

1. Regional Development
2. Strategic Planning
3. Marketing and Management
4. Software development and its commercial and industrial applications
5. Enterprising developers, Incubators, and Small and Medium size Companies.
6. Industrial Engineering and its applications
7. Mechanical Engineering and its applications

Mission of Research in the Extension and Liaison Headship:

- "To consolidate and be regionally recognized by the social and productive sectors as an Applied Research institution. To create within the CETYS University System a network of researchers and of strategic information and knowledge that is useful for entrepreneur and government decision-making."

We now present research that can promote this Headship:

1. Regional development research.
2. Sectoral studies of clusters.
3. Studies by Economic Activity Branch.
4. Market Research.
5. Process facilitation of Strategic Planning.
6. Research and application of Dot Net technologies.
7. Research and application of open standard technologies.
8. Studies and assessment to Small and Medium Size Compnanies.
9. Company incubators with a Technological Base (CTB).
10. Research and assessment for the implementation of the norm ISO 9000.
11. Research and assessment of the implementation of the National Quality Award Model, and of the Intra-government Model.
12. Research and assessment about family businesses.

Professional Schools: Engineering, Business and Administration, Social Sciences, and Humanities.

The scientific research in the professional schools at CETYS will be promoted fundamentally with an applied research focus especially for the solution of practical problems that are present in the Companies, Government, and

Decentralized Organisms. These practical problems are presented directly to the student as a result of their teachers' experience, from some assessment to the external organ, from specific request via School Directors, through the Liaison Committee, or by the Liaison Department of each campus.

Some possible topics could be Market studies, assessments in planning, administration, and accounting, social and family behavior studies and assessments in quality, production line balancing, manufacturing cells, and networks.

II. 4.2 Research Development Skills Subprogram

Postgraduate College

The high-level formation of human resources is considered by CETYS University as a priority activity to achieve the qualitative development in research and is given through three programs:

1. Students as Researchers: it is the formation of researchers through the postgraduate students' participation in the research projects carried out in the University. Their help could be as research assistants, as postgraduate dissertation students, or research as part of their subject. At any of these modes, the students will work under the assessment of the responsible professor-researcher of the project.

In the master's degrees, the students carry out their research in the subject "Application Project," and they present it in that class. In the doctorate degree, the students carry out their research from the beginning of the program, take three classes of doctoral dissertation, one class of research methodology, and one of advanced statistics with an emphasis in quantitative research.

2. Projection of researchers: this program contributes to the formation of researchers through a group of actions that with the support of extracurricular activities allows the doctorate and masters degree students to present their works in the different forums and spaces.

Such activities are the participation of national and international congresses, joint collaboration in investigations with national and foreign universities, publication in the editorial series CETYS University Postgraduate Collection, and in the CETYS research web page

3. Teachers as researchers: Research from Postgraduate allows coordinating the high school and professional teachers so they can carry out their projects directed to improve or implement a process inside their departments of schools. Likewise, they can participate as researchers in the projects that the Postgraduate College carries out in accordance to their specialization area. For such purposes, we have a database of the professors at the CETYS University System and their specialty area to include them in the external investigations that we carry out.

Extension and Liaison Headship

Starting from the analysis of the contents of the different subjects that you can take in the programs of technicians and the language center, you can determine the cognitive, skill, and dexterity abilities that each program is looking to develop in a unique way on the student. As a result of the previous analysis, we can design learning experiences that include the research development skills of the students.

These experiences can be, for example:

1. Search of bibliographical and web information related to the specific aspects of the subject or theme that is being studied.
2. Analysis information and presentation of applications to real situations that have a working impact.
3. Teamwork for the development of investigations related to themes or specific subjects.

Professional Schools: Engineering, Business and Administration, Social Sciences, and Humanities.

The research skills that will be carried out in each bachelor's degree using mainly two means:

a) specific methodology subjects of investigation and development of mind skills,
b) carry out works or tasks in an individual way or in a group for the different subjects. These tasks or works include bibliographical research as well as field research mainly in applied research and by using the case method.

Each professor, according to the goal of the subject, will promote the research skills development in all of his students. This could be done through the organization of academic events like symposiums, presentations, and congresses in the different areas of specialization of the degrees.

High Schools

At the High School level and in accordance to the curricular goals, it will promote the acquisition of the basic research skills using the scientific method as a working tool, developing a searching culture, and discrimination and analysis of information that involves the student in scientific events where he or she applies his or her knowledge to prove laws or scientific and technological principles.

The previous statement will be promoted through the subjects of research methodology and through the development of the mind skills as well each one of the subjects through carrying out applied, bibliographical, and field research. Also, through the participation of the student in academic events such as the "Science week."

II. 4.3 Institutional Research Subprogram

Institutional Effectiveness Headship

Different bodies of the institution carry out institutional Research at CETYS University. The Institutional Research provides proper information to the executive administration for the decision making be it internal or external. Any aspect of the institution is considered as appropriate for its study.

The methods of Institutional Research help distinguish the information given by this means from other sources including magazines, newspapers, external reports, conferences, operational reports, opinions form the professors, etc.

The Institutional Research falls in three formal categories:

a) Institutional Studies.

b) Administrative Analysis.

c) Periodic reports of administrative information.

The institutional studies respond normally to questions of the institution, to discreet situations, and unique in its activities, its programs, its public, or its services. A successful Institutional study gives a definite support to one decision or a group of decisions. The report of the study can be presented to a broad audience. The object of the study can be limited and specific, and belonging to a small part of the operative problem.

Examples:

- Longitudinal studies of graduate follow-up.
- Labor market.
- Potential demand.
- Market research of new service to offer.
- Worker satisfaction studies.

Administrative analysis is a formulation of the functions of the support staff guided by many professionals in the institution. Basically, they differ from the institutional studies in that the administrative analysis put administrative

problems in a conceptual perspective with options developed in actions and solutions. The costs and benefits of every option are determined, but recommendations are not given. In contrast, the result of an institutional study is the answer that we get.

Examples:

- Installed capacity.
- Costs of a program.
- Financial support.
- Salaries, benefits, and retirements.

Periodic reports of administrative information. Several offices of a college or university control their operations with the help of operative data reports. When they are carried out under a program, in a continuous form, they are considered as administrative periodic information.

Examples:

- Professor evaluation.
- Managerial evaluation.
- Financial information.
- Job analysis, responsibilities, functions, ranges, and salaries.

All the areas of the institution are potential candidates to participate in the institutional research. Specially the Marketing Headship, the Institutional Effectiveness Headship, the Educational Headship, the Curricular Development Headship, the academic headships of the campuses, and the Administrative Headship among others.

Postgraduate College

In this subprogram, Postgraduate participates in planning, evaluation, and decision making in the masters' degrees and doctorate programs. Above all due to the promotion that it has received in this level. For example, in the measurement of the impact of the academic report given to this professional level.

Some of the studies where this College would get involved to know such impact will coincide with the ones contemplated by the Institutional Effectiveness Headship:

- Longitudinal studies of graduate follow-up.
- Labor market.
- Potential demand.
- Market research of new service to offer.
- Employer satisfaction studies.

Also in the administrative aspect, the Postgraduate College considers the need to analyze the installed capacity for their current and future programs as well as their financial aspects. The academic aspects contemplate the evaluations of the teachers and researchers, and from the same management board.

Extension and Liaison Headship

In this section, the Extension and Liaison Headship can support the institution by carrying out the following activities among others:

1. Carry out market research over products or services that wish to be offered (new bachelor's degrees, new master's degrees. Etc.).
2. Employer satisfaction studies on the quality of the graduates, and the relevance of the included studies in the different professional bachelor's degrees, and postgraduate.
3. Longitudinal studies of graduate follow-up with different purposes such as:
    a) Professional updating.
    b) Working mobility.
    c) Responsibilities, functions, and salary ranges.
    d) Etc.

Curricular Development Headship and Educational Headship

These headships consider that besides the institutional research they will cover in a coordinated way the educational research. Both headships have as a goal to provide to the Academic Vice-chancellorship the technical, legal, design, and training elements so that the academic programs that the institution offers can be implemented in each one of the campuses with the required quality level.

The Curricular Development Headship is created from the Academic Reform of 2003-2004. From this moment, the projects of design and evaluation programs have been carried out in a coordinated way with the Educational Headship. In this sense, both headships are in the position to take and strengthen the institutional research plan in a joint way. Under such circumstances and taking as an analysis category the Academic Reform, these would be the possible research areas:

- Design, curricular evaluation and innovation in the three levels (High school, professional, and postgraduate).
- Formation and development of the professors (full time, part time, and by subject).
- Contemporary educational models and alternative methodologies.
- Information and curriculum technology.
- Education and values.
- Evaluation of the professors' work.

Removed from such lines, both Rectory headships consider the following as possible research educational and institutional problems:

- The electronic platform Blackboard and its repercussions in the students' learning.
- The educational model centered in the one who learns. Evaluation of an on-going experience.
- The university professor in the transitional period. A qualitative study in a comparative mode. The 90's and the current ones.
- To design an evaluation strategy to measure the impact of the academic reform in Postgraduate.
- A comparative/experimental study on the education at a distance versus the physical educational at a bachelor's degree level at CETYS.
- Comparative study of the professors' evaluation in the professional plan studies of the generations from 2000 to 2004, and the ones after 2004.

The institutional and educational research to be developed would have two intentions:

a. Decision making that affects the curriculum, the teaching formation, the learning strategies, and the reform in general

b. To actively participate in the educational research scene in Mexico, and taking the results of our investigations to congresses and seminars. As a result of these efforts, they are also headed to strengthen the editorial project of the institution.

It is important to point out an operational aspect: both Rectory headships will be linked with the academic area of the campus to promote this kind of studies as long as within their administrative structure they do not have an educational research technical support that perform this kind of works.

II. 4.4 Educational Research Subprogram

Postgraduate College

The commitment of the Postgraduate College, as the other educational levels from CETYS University have, is to explore, to evaluate, and to promote new forms of work in the teaching/learning processes. This should be based mainly in the conditions that the Curricular and Educational Development headships can foster. In case of the educational research, the Doctorate program in Education and Values gives the overview and the expectations that include this theme. The ones that stand out are the following:

- To form a critical mass that knows how to investigate, to be a leader, and to develop research projects.

- According to the educational reform, this program is more than justified by the humanistic education of CETYS University. On the other hand, the program will strengthen the academic scenes of the institution. Besides this, there is the intention to form a specific group of professionals with master's degree that works in different institutions and organisms in the region, and being these organisms of a formal education or not. The purpose for this is that during their doctorate formation they are able to evaluate and to resolve education problems.

- Considering that the student accepted in the program has historical, teaching, and research knowledge of education, this will facilitate the depth in the themes that concern education and values and with the resulting development of proper methodologies so they can carry out what they have learned.

- The central part of the study plan is directed to the basic categories for education and values: family, mass media, human rights, society, environment, and development.

Extension and Liaison Headship

In this section, the Extension and Liaison Headship can support the institution through carrying out, among others, he following activities:

1. Studies to determine new forms of granting the service in programs such as the Language Center, and Technicians.
2. To develop Pilot Plans to determine the results on different ways to render the educational services (hybrids, in a distance, asynchronous, etc.)

Curricular and Educational Headships

It has been established that in a coordinated way these two headships can develop institutional type projects as well as educational ones; this is pointed out in the part II.4.3 of the Curricular Development Headship.

II.5 Lines of inquiry

Lines of inquiry are those project groupings that are similar to a theme with a general purpose. A project defines a specific goal, the executors, the needed resources, the activity times, products as results, and other data that show the importance, impact, and feasibility of the project.

On the other hand, the lines of inquiry will preferably have as a base the academic fields that CETYS University is currently developing like Business and Administration, Social Sciences and Humanities, Psychology, and Engineering. Nonetheless, given the problems of our social surroundings where new needs and opportunities arise to develop other means of solution through the scientific

and technological investigation, CETYS University is looking at generating other lines of inquiry. Besides, as it is mentioned in the chart of the sub-chapter II.3, the participation in the investigations through the four subprograms is very broad.

The lines of inquiry that is present in this Plan give answers to the internal concerns of the university to achieve the big objectives of an educational system; also to the problems of the community concerning the economic, social, and cultural aspects. One must consider that these lines of inquiry and mentioned projects are at a proposal stages, and the goal is to promote them in the establishments of the institution as a function of the experiences and capacities of the academic personnel.

II.5.1 Scientific Research Subprogram

In these fields of knowledge, the projects included are the ones form the Postgraduate College, the Extension and Liaison Headship, and the ones from all the CETYS University schools.

Lines of Inquiry	Projects
Business and Administration	
Administration	• Strategic planning • Leadership
Marketing	• Consumer behavior • Service and product innovation • Development of new products • Perception and market study
Human resources	• Organizational behavior and climate • Wages and salaries • Organizational development • Training based on competition
Finance	• Financing evaluation sources • Evaluations of studies and yields
Economic development	• Regional development • Sectoral Studies • Competitiveness study

Public administration	• Organizational climate • Government Modernization • Public safety
International business	• Export projects • Public and private cross-border projects
Social Sciences and Humanities	
The family	• Intra-family violence and the community • The new families, the single-parent family • Gender factors involved in the formation of the couple
Migration	• Sociocultural aspects in the process of migration and adaptation of the families
Socio-psychology of education	• Values and education • Family and education • Special Education
Family businesses	• Problems of composition and succession • Sociocultural factor associated with the evolution of the family company
Engineering	
Quality systems	• Introduction of quality procedures • Re-engineering of the business processes • Domain and map charting processes • Methodology application improvement

	• Quality procedures in the organization • Impact of the quality systems in the regional industry
Engineering design	• Plant and processes design • Simplification of operations • Manufacturing cells, group technologies • Simultaneaous engineering • Quick assemblies • Incubation of a technolgical company • Product design • Tactical projects of the operational area • Optimization of automated systems for process control • Technology updating for the automation of processes in industries • Optimization of industrial systems • Design and optimization of Testing systems in semiconductor industries • Design and system implementation based in programmable controllers • Design and optimization of testing systems in electronic industries
Costs	• Administration based in costs • Manufacturing cost analysis
Environment	• Quality air improvement • Water treatement
Other opportunities • Multi-culturalism • Gerontology • Biotechnology • Agribusiness • Electoral studies • Robotics	

II.5.2 Educational and institutional research subprograms

These research themes preferably belong to the Rectory support headships, but with the participation of the academic units: Postgraduate, schools and high school, and Extension and Liaison.

Lines of Inquiry	**Projects**
1. Curricular development.	• The CETYS academic reform.

2. Formation and teaching practice. 3. Humanism and values 4.Educational technology. 5. Educational evaluation.	• The educational model centered in the one who learns. Evaluation of an experience in progress. • The university professor in the transitional period. A qualitative study of a comparative mode. • Study about the alternative ways to work in the classroom. • Values and university. Expressions of a humanistic formation. • Impact of the value systems of the cultural atmospheres of CETYS. • The electronic platform *Blackboard* and its repercussions in the students' learning. • Comparative/experimental study about education at a distance versus physical education at the bachelor's degree level at CETYS. • Curricular evaluation. • Teacher evaluation. • Social service and obtaining the degree.
Market studies	• New student satisfaction. • Program analysis (FODA, life cycle, portfolio analysis). • Statistical analysis of internal population. • Marketing behavior and statistical variances. • Vocational demand.
Market research studies	• Competition analysis • Statistical analysis of campaign database of feeding schools. • Measurement of the potencial working market. • Image and positioning in the community. • Opening feasibility for new programs.

II.5.3 The research development skills subprogram

The postgraduate and bachelor's degree teachers run its execution, and this includes the high school teachers so that starting at this educational level the research habits are fostered. As it is logical to suppose, the subject that these abilities are focus on are the students from the described levels. The foundation that supports this guideline is the CETYS educational model. As it was described in the first part of this plan, the model wants to promote the student's independence and to strengthen the skills through systematic educational experiences centered in learning to learn, and learning to do.

The graduate profiles of the three levels make it clear the promotion to the research abilities when it is expressed, among other things, that the student needs to have a solid scientific knowledge and must be able to identify, plan, and to resolve problems. As a result of these profiles, you can identify in the study plans of each of the academic programs subjects that have to do with research. Such is the case of the Research Methodology course that must take the student that is enrolled in a bachelor's degree. For Postgraduate there is a subject on design and project application that is found in the basic axis, and this makes it a compulsory subject.

Finally, a lot of the didactic strategies that are considered in the learning activities of the redesign subject programs under the CETYS educational model are directed to investigation, the search of information, data processing, and the delivery of research products on behalf of the student.

II.6 Other necessary aspects for the operation of the Guiding Research Plan

The Research Regulation constitutes an important instrument to formalize the scientific and technological activities of CETYS University as far as the participation of the academic and administrative areas; also the establishment of the financial and technical criteria for the selection of research projects and the assignment of funds, among other commitments. Next, we describe aspects that give order and sense to the development of the Plan. It is worth mentioning that some of them are included in the Regulation.

- The formation of a Research Institutional Commission that will give assessment and recommendations for the revision and approval of proposals of research projects. To follow-up and revised the achieved results even though it has other functions in the Regulation.

- Follow-up to the scientific and technologies activities is through policies, procedures, and formats with the purpose to know the advances, results, applied budget, and the participation of professors that are researchers and students. Likewise, for the processing of patents and author's rights when it is appropriate.

The gathering of information pointed out in the previous paragraph not only allows us to know by institutional interest the performance of these activities, but it also facilitates to comply with the requested information by official and private organizations; for example, for certification and crediting purposes.

- The budgetary assignment for the development of research projects. The publication and diffusion of its results is subordinated by institutional budgetary policies as well as the announcements for the request to support these projects.

As a part of the CETYS University policies concerning science and technology, the protocols and agreements are carried out with other high education and research institutions, companies, and government agencies with the purpose to get additional subsidies for research projects, organizing forums and congresses, exchange of research professors, and the participation in regional studies among others.

This Research Guiding Plan as the Regulation and other normative documents will be verified and updated periodically.

APPENDIX

Characteristics of CETYS University

CETYS University has the appropriate infrastructure for the development of the students' skills as well as to carry out research activities. In the next chart, we show the laboratories and workshops of each establishment that are mainly assigned to teaching. Nonetheless, some of them have the capacity to support research projects such as the materials, metallurgy, and air- conditioned among others.

Laboratory	Mexicali	Tijuana	Ensenada
Computer	**	**	**
Language	**		
Chemistry	**	**	**
Metallurgy	**		
Materials	**	**	**
Physics	**	**	**
Electronics	**		
Air-conditioned	**		
Machinery tools		**	
Gessel chaimber		**	
Photography	**	**	**
Biology and Health Sciences	**	**	**
Publicity and design	**	**	
Music workshop	**	**	
Plastic Aart workshops	**	**	
Engineering laboratory			**

Laboratories and workshops

The degrees that are currently given at CETYS University are developed through the programs described in the following charts.

Bachelor's degree at the Mexicali campus

Engineering	Business and Administration	Social Sciences and Humanities
• Mechanical Engineering • Industrial Engineering • Electronic Sybernetics Engineering • Computer Science Engineering	• Internacional Public Accountant • Bachelor in Business Administration • Bachelor in Marketing Administration • Bachelor in Internacional Business • Bachelor in Graphic Design	• Lawyer

Bachelor's degree at the Ensenada campus

Engineering	Business and Administration	Social Sciences and Humanities
• Mechanical Engineering • Industrial Engineering • Electronic Sybernetics Engineering	• Bachelor in Business Administration • Bachelor in Marketing Administration • Bachelor in International Business • Bachelor in Graphic Design	

Bachelor's degree at the Tijuana campus

Engineering	Business and Administration	Social Sciences and Humanities
• Industrial Engineering • Computer Science Engineering • Digital Graphic Design Engineering • Electronic Sybernetics Engineering	• Internacional Public Accountant • Bachelor in Business Administration • Bachelor in Marketing Administration • Bachelor in Internacional Business	• Lawyer • Bachelor in Clinical Psychology • Bachelor in Educational Psychology • Bachelor in Organizational Psychology

Postgraduate programs in the CETYS University system (Mexicali, Ensenada, and Tijuana campuses).

	Master's Degrees	**Doctorate**
Business and Administration	• Corporative Finances • Marketing • Human Resources • International Business • Public Administration • Economic Development • Administration MBA • Taxes	• Administration
Social Sciences and Humanities	• Criminology • Psychology • Family Therapy • Education	• Psychology
Engineering	• Industrial Administration Sciences • Materials and Logistics Administration Sciences • Control and Automation Sciences • Productivity and quality Sciences • Design and manufacturing process Sciences • Distributed Computer Systems Sciences • Telecommunications and Network Sciences	• Engineering