



**TRANSFORMANDO LA EDUCACIÓN
DESDE UNA PERSPECTIVA INTEGRAL:
INNOVACIONES A TRAVÉS DE LA
INVESTIGACIÓN**

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Transformando la educación desde una perspectiva integral: innovaciones a través de la investigación

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CONTRIBUTION OF THE MULTIMEDIA TECHNOLOGIES COURSE TO THE GRADUATION PROFILE

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1. INTRODUCTION

Designing the curriculum in higher education based on competencies is not simple, it involves a methodology, time and resources for the institutions and it is important in the professional training that society desires. Tobón (2007), presents a proposal based on different experiences gathered from various university institutions in Latin America, which consists of three phases: Training direction, curricular organization and learning approach, illustrated in Figure 1, where the main point is to form the team that will carry out the activities of curriculum design or redesign, also in this phase the institutional pedagogical model that will be followed together with the regulations and the training project of the study program is contemplated, The construction of the graduate profile, the study plan and the training process is also contemplated as a fundamental part of the evaluation process, the modules or training projects and the design of the sessions to be able to carry out their implementation.

Tobón's (2007) model contemplates different pedagogical approaches that methodologically guide the learning processes, as described in Table 1.

With regard to the graduate profile or also called professional profile, it is defined as a set of traits identified as competencies, skills, knowledge and attributes that a student has acquired, which is evaluated and legally endorsed by an educational institution, in order to be recognized as a professional in the area of knowledge in which he/she developed and is recognized by society (Corvalán & Hawes, 2005).

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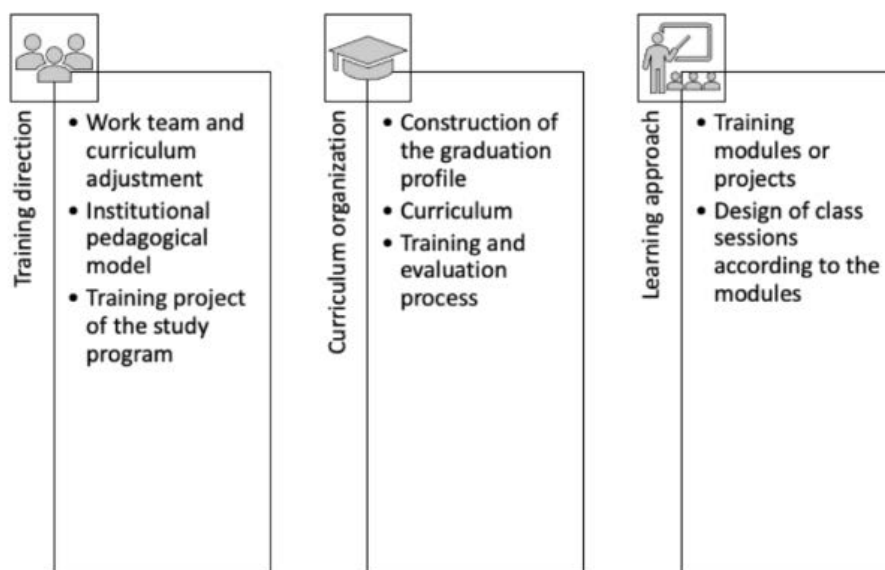
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Figure 1

Phases of curriculum elaboration



Source: Own elaboration based on Tobón (2007).

Tabla I

Pedagogical approaches in competency-based models (Tobón, 2007).

Type of approach	Description
	<i>Conduct as people's behavior in the competitive aspect in the organizational field.</i>
<i>Behavioral</i>	
<i>Functionalist</i>	<i>The fundamental characteristics for individuals to achieve their objectives in the work and professional aspect focused on their respective work roles.</i>
<i>Constructivist</i>	<i>To visualize competencies as sufficient skills, abilities and knowledge to achieve all the professional challenges required by companies.</i>
<i>Complex</i>	<i>The competences, facing the different activities and the great challenges to improve the quality of life, promoting professional development in a demanding society, looking for a work balance.</i>

According to Martínez (2015), he states:

The graduate profile is built in the set of values, traits, aptitudes and capacity that it is aspired to form in the future professional through the educational teaching process that the University carries out on behalf of society. The form in which it materializes the planning and organization of this educational teaching process is through the curriculum and academic programs. (Martínez, 2015, p. 2017).

The final objective of the curriculum is to capture the needs of society and form a specific professional, which is identified through the graduate profile or professional profile, this is carried

out through the study plan which is the basis for the development of the teaching process and which defines the nature of the university career.

1.1. Graduate profile of the Bachelor's Degree in Computer Science

The Bachelor's Degree in Computer Science is taught in the Faculty of Physical and Mathematical Sciences of the Universidad Autónoma de Nuevo León, which aims to prepare highly qualified students, that is why we offer a quality education, always training teachers in current technologies as we currently live in a fast-paced environment which has a rapid advancement in innovation and updating of technologies, This demands better prepared and more competitive students, resulting in talented web developers with knowledge of components and technologies at the forefront of a labor market that every day is more demanding, demanding and competitive (UANL, 2022a).

The curriculum design was based on the 2015 UANL educational model, which is based on six guiding principles:

Structuring Axes

- Education focused on learning.
- Competency-based education.

Operational Axis

- Flexibility of curricula and educational processes.

Transversal Axes

- Internationalization.
- Academic innovation.
- Social Responsibility

The curriculum is formed by 5 areas which are:

AC: Curricular Area

ACFGU: Curricular area of general university education.

ACFB: Basic training curricular area

ACFP-F: Curricular area of fundamental professional training

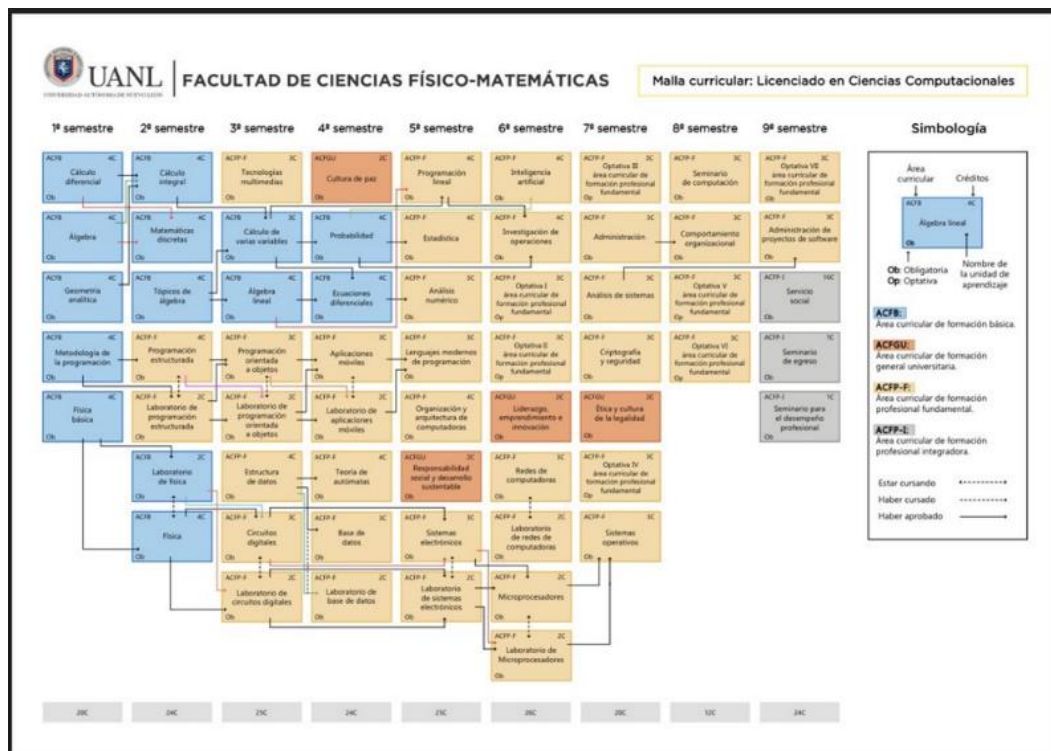
ACFP-I: Integrating professional training curricular area.

The curricular program is shown in Figure 1, which shows the curricular areas and the blocks that make up the curriculum.

The graduate profile of the Bachelor's Degree in Computer Science is established with the following purpose To train professionals in Computer Science capable of designing computational solutions for public and private organizations through critical reasoning, with an ethical sense, social responsibility and collaborating within multidisciplinary teams. Competent to analyze, develop, evaluate, innovate and implement computational technologies through the application

of computational sciences in the scientific, academic and social fields; provide specialized technical support to ensure the operation of existing technological solutions; advise in the processes of digital transformation; as well as manage research projects and cutting-edge technological development that contribute to create bridges between real problems and digital solutions, generating technology and knowledge transfer. All this in order to improve business processes through decision making based on data analytics and artificial intelligence, technological adoption of hardware and software solutions and automation of activities within organizations (UANL, 2022b).

Figure 2
Curriculum of the Bachelor's degree program in Computer Science



Note: Courtesy of the czreer head

1.2. Specific competences of the career are highlighted:

C1-Develop computational technologies using cutting-edge software tools, methodologies and computing paradigms, respecting the norms, standards and practices of national and international organizations for software development, in order to contribute to the digitization and automation of the business process of organizations.

C2-Design hardware and software technological solutions to problems and areas of opportunity of public and private organizations through mathematical modeling and data analysis, working collaboratively in multidisciplinary environments, to increase their competitiveness.

C3- Manage projects of technological infrastructure, telecommunications networks and computer systems through the supervision of technological resources of hardware and software

used with professional ethics that ensure their optimal use and correct implementation in order to improve the products and services offered by organizations.

C4- Advise organizations in digital transformation projects in a critical and proactive way on the challenges and problems in the industrial, educational, health, commercial, service and entertainment sectors that allow the adoption of emerging computational technologies with the purpose of increasing productivity and obtaining better results with lower workloads.

These competencies are the attributes that graduates should acquire at the end of the career and that will facilitate their labor insertion, since they are the ones demanded by society to perform in an efficient and integral manner.

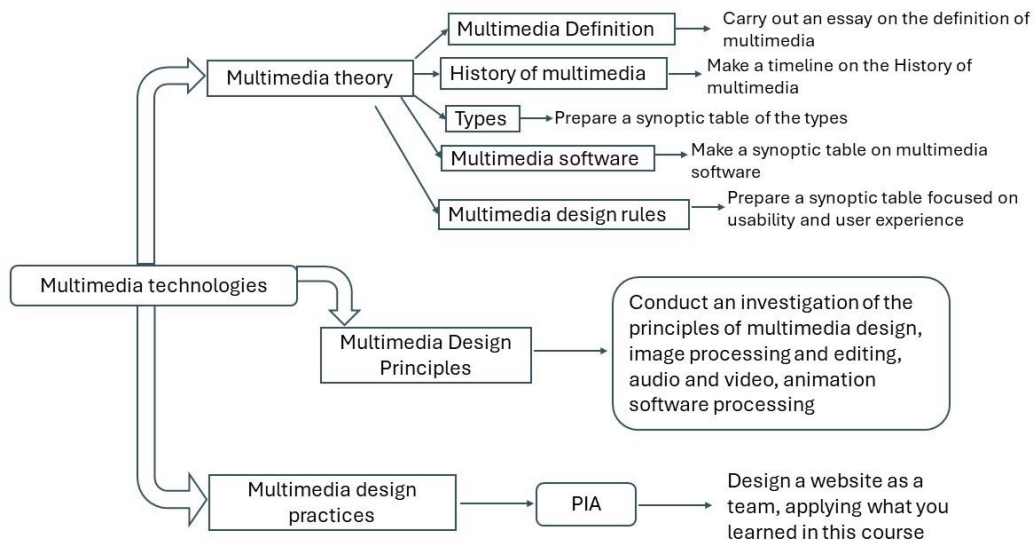
1.3. multimedia technologies and their curricular assessment in computer science

Multimedia technologies are fundamental tools in the field of Computer Science, since they allow the integration of different forms of content, such as text, images, sound and video, in interactive and communication applications. These technologies offer many possibilities for developing innovative software and applications, as well as for analyzing complex data and visualizing information. In curricular terms, their inclusion provides students with a practical understanding of the creation and manipulation of multimedia content, which is essential in today's technological environment.

The subject or also called learning unit, in figure 3 shows the development map, which begins with the multimedia theoretical bases, the principles of design and culminates with the practical part. They master the basic operation for web programming, which is a core part of the career.

Figure 3

Learning Unit - Multimedia Technologies



Note: Own elaboration

1.3.1. Competences developed in the course

The competencies developed during the course will allow the student to interact with the different multimedia elements, such as audio, image, video, code; assimilating techniques that allow him to transform his knowledge into an innovative project, in which the student demonstrates the acquired knowledge, being able to develop web pages, among others.

2. OBJECTIVES

2.1. General objective of the study

The objective of this study is to evaluate the impact through the effects of a subject of the curriculum: Multimedia Technologies, on the graduate profile of the Bachelor's Degree in Computer Science from the perspective of students, graduates and faculty.

3. METHODOLOGY

The methodology corresponds to a qualitative paradigm, since it seeks the experience and experience (Serpa et al., 2018) where depth is sought in the understanding of the perception of the participants of this study. The in-depth interview was used, taking the work objective, the interviews were semi-directed and based on a script referring to the topics to be addressed and other aspects related to the object of study were addressed during the interviews, some interviews were conducted through the WhatsApp application, the TEAMS platform was also used in audio, video or in written form, which were subsequently transcribed for analysis and search for information on the topic of study, only one question was contemplated to choose options corresponding to the 4 specific competencies of the career.

The participating subjects are students, graduates and professors of the Computer Science degree program. They were assigned an identification code, indicating EST-LCC_S### for students, EGR-LCC_S### for graduates and PROF-LCC_S### for professors, indicating the participant number at the end of the code that replaces ###.

A verification and triangulation was carried out through other researchers and research related to the study looking for consistency between the results of the participants, a method pointed out by authors such as Romero-Rodríguez et al (2019) and García (2009).

4. RESULTS AND DISCUSSION

The results obtained from students related to the graduate profile are centered on the fact that the Multimedia Technologies learning unit contributes to the introduction of WEB development benches that are fundamental pillars of their careers.

The results from the students who are currently finishing the Multimedia Technologies course allowed them to be introduced to the concepts of Web development, to the knowledge of new multimedia tools and as a base to continue learning in the following blocks of the curriculum.

«It helps me to know the different multimedia tools that exist today and that can help me in the future (EST-LCC_S003).»

«It contributes positively in areas of web design, and in use of multimedia material to improve the user experience.(EST-LCC_S007).»

«It allows me to have better tools to learn future topics.(EST-LCC_S014.)»

At the end of the course they were able to obtain the competencies required as graduates and to consolidate projects by applying their theoretical knowledge.

«The achievement of finishing the subject by developing a web page helps me in the backend/frontend process for web.(EST-LCC_S023)»

«...was part of my learning and was of the subjects needed for the development of the Integrating Learning Product.(EST-LCC_S043)»

As challenges they presented the mastery and application of programming languages in their final projects.

"The use of HTML, CSS and Java for the final project EST-LCC_S023)"

«Learning about editors EST-LCC_S005)»

«Learning HTML and CSS EST-LCC_S032)»

«Learning various software tools EST-LCC_S025)»

Also the development of visual design, which they consider to be an area of opportunity to work on as graduates of the Bachelor's Degree in Computer Science.

«Visual design, which is not usually a strength of LCCs EST-LCC_S027)»

«Making a web page with multimedia EST-LCC_S035)»

The students identified the subject as opportunities to increase their abilities and use of programming tools, learn something new, develop visual organization skills.

«Increase my capabilities around the work environment, knowing different programs .(EST-LCC_S004)»

«Learning to learn .(EST-LCC_S024)»

As regards the learning developed during the course and their professional life, the graduates say that the basic concepts in multimedia technologies helped them to enter the world of technologies, which provided them with the ability to understand the language related to multimedia technologies within the context of their professional life.

«By completing the subject of multimedia technologies I had the opportunity to learn the different types of multimedia that computers can offer us, from video and audio processing programs, to how web programming works. The content of the course helped me mainly to orient myself about concepts that I frequently heard in the world of technology... (EGR-LCC_S001)»

As a third semester subject, the graduates show the contribution of their training in their developed activities and to the graduate profile of the Bachelor's Degree in Computer Science, being present the acquired and significant learning, in addition to the competencies achieved.

«Thanks to this experience, I have been able to apply this knowledge in my life as a graduate, which has given me a more precise understanding of the web programming concepts that I work

with on a daily basis. In addition, I have gained a more solid understanding of the various multimedia formats that play a key role in the creation and optimization of websites.(EGR-LCC_S002)»

The responses of the faculty are fundamental, as experts in the subject and as trainers of human resources, in this case at the undergraduate level. Multimedia technologies in the Bachelor's Degree in Computer Science as part of the beginning of the professional training block is the basis for professional training.

«...in the subject of multimedia technologies it is important that students are with the evolution of technology, and much of that evolution is the theme of this learning unit, guiding students to interact with all the software that allow them to benefit from using all the tools that technology offers them, such as video, audio, photography, for example, the core of social networking is that (PROF-LCC_S003)»

The faculty is familiar with the contribution of the subject and the concept of the graduate profile, this is of great importance, since this fact indicates that the institution carried out the curricular design incorporating the faculty into the process, as Tobón (2007) states in his curricular design model in stage 3, in the design of the training modules and the study programs, incorporating the main actors to carry out these important activities of the process.

«...and our graduate profile should always be familiar with the topic of multimedia content management, especially since all this is moving in web and mobile technologies, so, in the development market, this is very demanding, then, I think it is necessary, even to be able to take this type of subjects so that the future graduate is always familiar and also collects important skills with respect to what is currently moving in the world and in the market, after all. (PROF-LCC_S003)»

He also points out that it is a lifelong learning which enables him to make decisions.

«...in the development of web pages, always analyzing usability and user experience, always thinking about how they would see the development of the page and remembering the elements used in this basic learning unit (PROF-LCC_S002)»

The students and graduates participating in this study as a whole indicate that the specific competency C1 Develop computer technologies using state-of-the-art software tools, methodologies and computing paradigms, respecting the norms, standards and practices of national and international organizations for software development, in order to contribute to the digitization and automation of the business process of organizations is achieved in this learning unit, which is what they developed during the course.

5. CONCLUSIONS

The graduation profile is the main part of the curriculum design process, since it is what is expected to be obtained and what society demands, as a final product; but it is also the starting point for the design of the curriculum and all the elements that compose it, such as the learning

units or also called subjects, each of which contributes to the acquisition of skills, abilities, knowledge and competencies. With the analysis of this work, it was concluded that the design of the content of the learning unit that was studied as a case, contributes to achieve the specific competencies of the graduate profile from the perspective of the student, the graduate and the teacher, being an introductory subject. Also as a reflection, the importance of updating the study programs, especially in these careers focused on technology and the rapid changes that have occurred in recent years, although it is always necessary to include the bases or foundations that are required to take the student and also the teacher by levels, since the latter is the most important actor as it requires training to update their professorship or to meet the profile to teach the assigned subject.

Another point of great importance is to rethink the times established to update the educational programs, the contents of the study programs, and the needs of the formative processes of the teachers, but above all, how to measure the results of the creation and design of the programs and answer if the student is really being trained to achieve a professional that performs and develops with quality and satisfies the needs of society and also achieves a quality of life.

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