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Medellín District of Science, Technology and Innovation: An Opportunity to Reinforce the Curriculum of the Public Accounting Program with Artificial Intelligence?

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Summary

Aim: The research analyzes the academic curricula of several universities in the City of Medellín such as the Science, Technology and Innovation District, the importance of updating the curricula of the public accounting career is analyzed. *Theoretical framework:* Every time information technologies advance in an accelerated manner, causing changes in the profession of accounting science, therefore, universities are immersed in periodically evaluating the demands of organizations on public accountants, the results of the business field. Today they demand that the learning of information technology (ICT) be strengthened from the academy in the classroom of the public accounting program class. *Method:* The importance of incorporating the subject of digital innovation is analyzed based on the documentary review, such as the Syllabus proposal with the topics that must be addressed, with sufficient credit hours, where the automation of processes, systematic language, artificial intelligence are taught. and Big data analysis. *Results:* The academic curricula reviewed in the sample are not updated or in their form do not contain current topics in information technology and artificial intelligence. *Conclusions:* It is necessary that universities that offer the Public Accounting program update their academic curricula with the new demands of the business market with reference to information technologies and artificial intelligence that are useful for a competent accountant.

Keywords: University, Public Accountant. Information Technologies, Systematization, academic curriculum.

1 Introduction

According to Guo, & Albattat, (2023), education is designed in a series of areas, such as the improvement of the educational system, educational management, teacher performance, and teacher identity. This research focuses on the analysis of the need for public and private universities that offer undergraduate and graduate programs in the Public Accounting line in the City of Medellín, according to Surianti (2020), Rahmayanti and Rahmawati (2020) Ghasemi et al. (2011), J. Coyne et al (2016). The program's academic curriculum must be updated with the new demands demanded by the business market, Appelbaum et al. 2017; Issa, et al (2016) to public accountants and professionals who are in practice as auditors, about the skills and competencies in new information technologies such as process automation (RPA), Big data,

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data analysis, management of virtual tools, artificial intelligence, data mining, such as the use of robotics in work in the financial area, Pan and Seow (2016), Issa et al. (2016). Since Taipaleenmäki and Ikäheimo (2013), Kokina and Davenport (2017). Changes in organizations are advancing in an accelerated manner where companies currently hire developers (systems engineers) to automate administrative processes accompanied by company accountants, to efficiently facilitate the operations of the companies. Pickard and Cokins (2015). Wolf et al (2020), such as the processes in the accounting and finance departments, on the analysis of the academic curricula of the different universities, academic subjects of accounting, finance, control, taxes and information analysis stand out, without evidencing one aimed at information technologies, in turn it was identified that 60% of universities do not have accounting, financial auditing, compliance control software in their classrooms for learning that contributes to business practice that will be faced by students in the course of professional practice or in the execution of their tasks in accounting and auditing.

2 Frame of Reference

The culture of public accountants and auditors in practice with vast experience in the market have the perception of the need to improve financial education, given the prevalence of financial knowledge and skills Olano (2023), in turn, RPA software houses are a risk for the profession or it will be a loss of jobs for collaborators in the area compared to their functions, which is why in the implementation of automated processes they prefer not to contribute directly or, failing that, not to provide information on the processes carried out by accountants in their work that they carry out manually. This culture generates delays in the systematized implementation in some companies, therefore Therefore, in practice, we must seek to eliminate this perception, with the sole purpose of ensuring that the strategic objectives are met and that human errors are eliminated in each of the processes that the company has. Pincus et al. (2017) These business dynamics that are presented must be brought to the academy so that future professionals are competent in the market, although the regulatory dynamics of higher education differ in each country, an analysis must be carried out on their opportunity to prepare a professional. competent. Software providers of RPA tools are business-oriented, and easy to control, therefore it is a need for the administrative and financial part of organizations to control operations.

An opportunity that exists for the public accounting program and for other professional careers is that the Municipality of Medellín in Colombia was recognized since July 14, with administrative act No. 01 of 2021, granting it the quality of Special District of Science, Technology and Innovation in the city of Medellín. went from being a municipal territorial entity to a district entity, under the terms of article 286 of the Political Constitution, it is not obliged to make administrative adjustments that increase its operating costs. It guarantees the continuity of the functions and powers that reside in the Metropolitan Area of the Valle de Aburrá, including that of environmental authority. The municipalities of the Aburrá Valley Metropolitan Area that so consider will be able to access the benefits of the Special District of Science, Technology and Innovation of Medellín and for this a law will be needed to regulate it. Significant progress has been made in the municipality of Medellín in seeking solutions in the business, state and society fields through information technologies where citizens such as young people and universities participate through project and training plans provided by the mayor's office, participation is made visible. The new dynamics are developed in the different regions of the country of Colombia, where the Ministry of Science, Technology and

Innovation (Minciencias) grants resources to researchers through the different projects that are approved for application.

According to the literature Holmes et al (2022), Vicente et al (2020), Qasim and Kharbat (2020); Tapis and Priya (2020); Vincent, Igou and Burns (2020); Bakarich and O'Brien (2021); Showalter and Krawczyk (2022); Holmes and Douglass (2022), the implementation of artificial intelligence (AI) technologies in organizations, helps public accountants for work performance and the elimination of risks of errors in each of the activities in the processes. Qasim et al (2020), Lin and Hazelbaker (2019) recommend that accounting curricula should incorporate artificial intelligence, robotic process automation, and computer programming. Regarding information technologies compared to the technical knowledge acquired in study centers and those required by the business field, with respect to artificial intelligence Issa et al. (2016, 17) determines that it will serve to automate routine tasks in accounting and auditing processes in an easier and simpler way. AICPA (2023), considers that change requires a change in the way the United States views accounting. Bipartisan bills before Congress will do just that, recognizing accounting as a science, technology, engineering and mathematics (STEM) educational field, establishing the sector as a valuable STEM career path. The American Institute of Certified Public Accountants (AICPA), the nation's largest member association representing the accounting profession, says this designation will strengthen the diverse and needed talent pool in the field, benefit employers across all sectors, and will strengthen America's competitiveness in global markets.

The article is divided as follows (1) introduction, (2) theoretical framework, (3) methodology, (4) results, (5) discussion and (6) conclusions.

3 Methodology

The research has a mixed methodology, the academic curricula of the different universities that offer the public accounting program in the District of Medellín will be analyzed to determine the incorporation of emerging technologies in the academic curriculum. The sample size The HEI population is presented in the database presented in Table 1, which describes the population: number of current programs and accounting courses under ICT. To collect information, through primary sources in the IES, I) the curricula of each of the universities that offer the accounting program were analyzed.

Board. 1: Universities Selected as a Sample.

IES PRIVADA	Undergraduate	Accounting Course – ICT
Autonomous University Foundation of the Americas	Public accounting	International accounting
Sabaneta University Corporation	Public accounting	Accounting Systems and Software
U of Colombia University Corporation	Public accounting	International accounting
Marco Fidel Suárez University Institution	Public accounting	International accounting
María Cano University Foundation	Public accounting	International accounting
Colombian School of Marketing Foundation	Public accounting	International accounting
CES University	Public accounting	International accounting
EAFIT University	Public accounting	International accounting
Saint Bonaventure University	Public accounting	International accounting
Remington University Corporation	Public accounting	International accounting
Cooperative University of Colombia	Public accounting	Accounting software
University Corporation God's Minute	Public accounting	Accounting software
American University Corporation	Public accounting	Accounting software
Northern Catholic University Foundation	Public accounting	International accounting

Source: Self Made.

Business Sector Surveys

As a second procedure, surveys were carried out via email from the different employers that hire accounting students in the financial area in the District of Medellín, according to the database of the Chamber of Commerce of Medellín, the specific questions were the following: What skills do employers of public accounting students perceive as most important in their potential employees? , the results helped to confront the need to align academic curricula to current business needs, as a mechanism for the contribution of accounting science and society.

Proposal for the Subject in the Micro Curricular Design of Public Accounting

The contribution of the research is the proposal is the creation of the syllabus, for the incorporation and teaching-learning of the subject of emerging technologies to the public accounting program, intended for the improvement of public accountant skills for their exercise for the contribution in the organizations.

4 Results

Analysis of the Public Accounting Academic Curricula

The integration of ICT in the public accounting program, offered by the different universities selected in the research, was analyzed in the academic curriculum, of which it was possible to detect that one hundred percent of these have the subject of systems and software. accounting emphasized in the professional practice of students in the dynamics of the approach in the accounting package that are offered by different Software houses such as:

Alegra: The most recommended accounting software for small and medium-sized businesses (SMEs). It contains all the modules for managing finances, inventory, payroll and more. It has excellent pricing plans and a free trial for 15 days. Alegra (2022).

Siigo: One of the most popular accounting software companies in Colombia. However, its platform does not have all the functions necessary to work in the cloud. Siigo(2022)

Loggro: A good option if you need the most basic functions in accounting. However, their prices are higher and they still have quite a few improvements to implement in their accounting program. Loggro (2022)

a2 Accounting: it has been designed taking into account the importance of accounting information for companies. We provide solutions programmed in accordance with the criteria of accounting professionals, and oriented towards simplicity and practicality. Your application must be flexible to handle the information and organize it in such a way that, in a few steps, you prepare it as you wish for accounting analysis. A2 Accounting (2022).

Among others, it is considered necessary by the faculty of administrative and accounting sciences of the different universities, which are selected or inclined towards an accounting program according to the experience that the teachers who teach the subject have had in accordance with the practice they have had in the different companies, the academic curriculum that is assimilated by default by universities is detailed in Figure N.1.

This subject focuses, as a first step (I), on the teacher's teaching practice with physical or virtual accounting exercises, on the creation of a commercial company on paper, without the need for it to be registered in the city's Chamber of Commerce. and in the DIAN, the Directorate of

National Taxes and Customs, the second step (II), focuses on the explanation of the creation in the accounting module of the company, and the (PUC) Single Accounting Plan of a company of Group number 1 or group number 2 with the classification of the International Financial Reporting Standards (IFRS). The third (III) step, the teacher explains how the different accounting records of the balance sheet and income statements are made and finally the generation of financial reports such as auxiliaries, trial balances and financial statements.

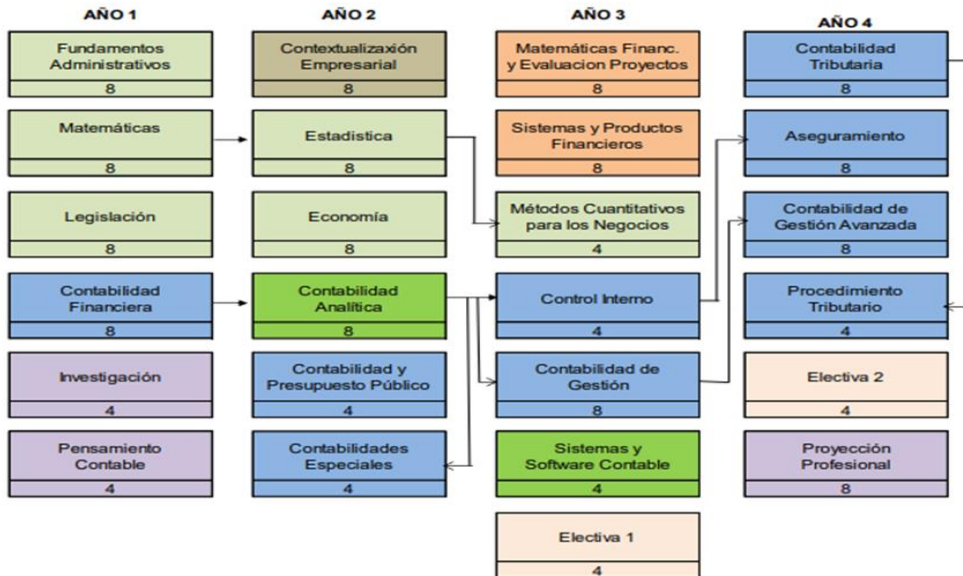


Figure N. 1: Academic Curriculum of Public Accounting.
Source: Academic Curriculum of the Ceipa Accounting Program (2022).

Over the course of the study plan, it is not possible to identify a subject that manages to identify the topic of automation Robotic Processes RPA: Fundamentals and Implementation, Analysis and Visualization of Massive Data (Visual Analytics and Big Data), Blockchain and Cryptocurrencies, the Extension of XBRL file, such as the presentation of financial statements and financial reports with the new technological tools that exist in the market, which help the future accounting professional have the basic and technical knowledge of the tools that can be used for the automation and analysis of the information to be more efficient in the different day-to-day activities in organizations and thus avoid risks of errors in the different processes of the accounting department.

Skills currently required of Accounting professionals

It is necessary that public and private universities take into account the skills that are currently required of public accounting professionals by employers with the new challenges of emerging technologies such as artificial intelligence to automate processes and make an accountant more analytical of financial information, for this an alliance must be sought between the University, the business sector and the State, with the latter with the regulation of academic regulations and renewal of academic programs, allowing each of the participants to offer and allow the generation of jobs, professional development of students and growth of the country's economy. To identify this need, I conducted a survey of a total of 50 businessmen located in the geography of Medellín District of Science, Technology and Innovation, where they were asked: What are the skills that employers perceive of the most public accounting students?

important in your potential employees? As identified in Figure N.2.

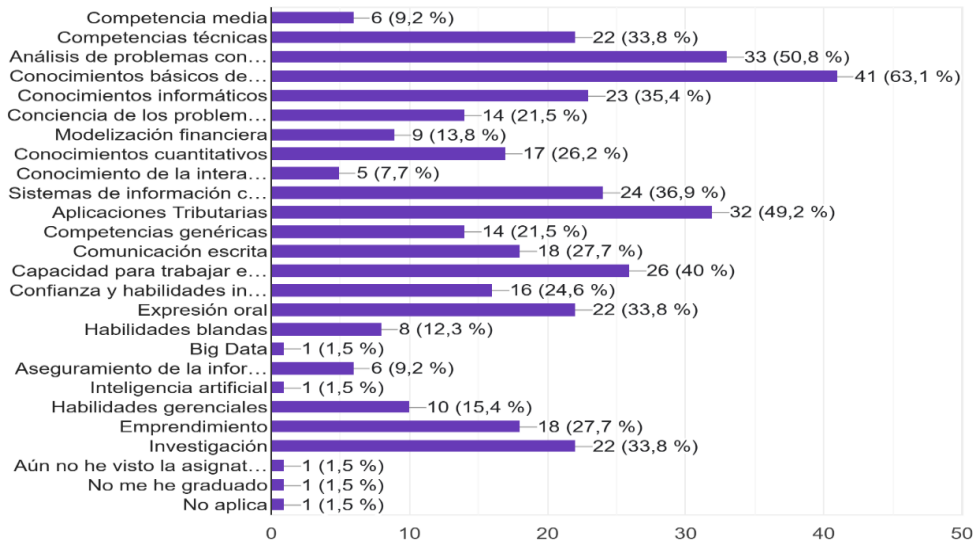


Figure 2: Skills that Companies Require.

Source: Self Made.

Regarding the different skills required of public accounting students, it is highlighted that the technical competencies of Accounting are (33.8%), problem analysis (50.8%), computer knowledge (35.4%), Big data and artificial intelligence (40 %), the consulting firm Deloitte (2022), in its research determines that AI will seek Collective solutions for shared problems: Shared solutions created through collaboration and information exchange will radically improve the accuracy, timeliness and performance of non-competitive functions .

financial modeling (13.8%). According to Deloitte (2022), the financial modeler must master the tool (generally Excel), take advantage of its possibilities and know its limits. However, knowing Excel is a prerequisite, but not the most critical aspect. A modeler is not only an expert in Excel functionalities, but must also know the best modeling practices. In order to inspire trust and remain understandable to all parties, a model should be developed as a shared repository. That is why modeling experts obey international standards of best practices. In Latin America, where the model is often assigned to non-specialist teams, practical improvements are little known. The results show that organizations are requesting from the collaborators of future public accounting students who are in professional practice the development of information technologies apart from technical skills. The results of the surveys help to contrast the need that the business field is demanding for public accountants, in emerging technologies, supported by one of the assessments of the Big four firm Deloitte. Without a doubt, it is a challenge for each of the academic, business and State parties.

Proposal for the subject in the micro curricular design of Public Accounting

The research contributes to the approach to the development of the robotic process

automation and data analytics course, for the public accounting program in all face-to-face and virtual modalities. Below, each of the proposed topics and subtopics is detailed. in the course which must be approached carefully.

Table 2: Proposed Subject on Information Technologies.

Subject				Robotic Process Automation and Data Analytics					
Area				Professional					
Code				Pensum					
Corequisites				Prerequisites			Accounting software		
Credits	4	TPS	4	TIS	8	TPT	64	TTT	128
Know (declarative content)									
1. Robotic Process Automation RPA: Fundamentals and Implementation -Fundamentals in RPA - Business process analysis - RPA implementation - Deployment of RPA in the organization - AI elements									
2. Analysis and Visualization of Massive Data (Visual Analytics and Big Data) - Databases for big data -Data analysis and interpretation -Artificial intelligence techniques -Engineering for massive data processing -Interactive display of information									
3. Blockchain and Cryptocurrencies – Cryptomodes - Blockchain Technology - Electronic wallets									
4. XBRL File Extension - APP and New Trends of Financial and Non-Financial Reporting									

Source: Self Made.

The learning outcome of each topic and its importance in incorporating the public accounting curriculum is described.

Robotic Process Automation RPA: Fundamentals and Implementation: The operational dynamics of organizations advance at a pace that allows the managers of each of the companies to become aware of the updating of processes such as the automation of tools. RPA, in the financial part, companies advance the automation of each of the activities of the financial area processes with the collaboration of the systems department area in the internal projects that are carried out or with external consultants who offer the type of this service, with the aim of being more efficient to improve productivity, public accountants of organizations play an important role in automation processes with the help of system developers that require understanding the financial activities that are carried out with the help of the accountant. develop automation. Although currently the accounting program curricula do not contain theoretical and practical topics on Robotic Process Automation RPA: Fundamentals and Implementation, the public accountant must address RPA concepts and notions in professional practice.

Analysis and Visualization of Massive Data (Visual Analytics and Big Data): The objective of the development of the learning objective is for the student to be able to use free and licensed Analytics and Big Data tools to satisfy the information needs of organizations.

- Extract Large Volumes of structured and unstructured information to facilitate assertive decision making in organizations.
- Transform large volumes of information to store and process it in search of agile solutions for organizations.
- Use free and licensed Analytics and Big Data tools to show the results of analytics, allowing you to deliver Visual information for decision making.
- Use free and licensed Analytics and Big Data tools to manage Business Intelligence projects

that generate value for their entities and their economic environment.

Cryptocurrencies: Around the world, great advances are being made in the regulation of Cryptocurrencies, it is necessary for the accountant to know the tools where cryptocurrencies are negotiated and the different types that exist, as well as the different risks that exist, accompanied by the regulations of the tax administration and the Superfinanciera.

XBRL file extension: The main objective of the accounting student is to recognize the language of

In general, universities are required to administratively advance the budget request for the different software that will be necessary in the subject of emerging technologies in the accounting program for their respective approval by the governing councils of public and private universities, other The fundamental challenge will consist of the training of the teacher assigned to the subject who has the skills to teach the subject and to evaluate it with the different instruments that exist to measure the student body. If so, the mechanism to teach the course and evaluation is considered to be It should be more practical than theoretical, where from the beginning to the end the progress of cases is being evaluated with the different variables that are left in the activity. Without a doubt it does not mean that the theory about the concepts is stopped being taught. elements of each of the themes.

5 Discussion

According to what was expressed by Chiu et al. (2019), Dunlop-Hinkler et al. (2011), technology is a support in the business field that allows the agility of processes and financial information, data analysis, for which students must adopt the growth skills of emerging technologies. According to Baldwin et al (2023), the accounting profession generates trust in the financial information of companies, being a pillar for a prosperous society. Both the accounting profession and the other disciplines require data analysis, which is why the updated curricular content and models to address them, therefore the results of the research determine that the accounting profession from a national and international level requires the updating of professionals from the university academic and state as guarantors of society. According to The American Institute of Certified Public Accountants AICPA, (2023), Technology has transformed the way Americans work, fundamentally altering the opportunities and responsibilities of certain professions. This has been especially true in the accounting profession, which has been reshaped by technology. On a day-to-day basis, certified public accountants (CPAs) manage and analyze big data and data security, and services now require expertise in IT, artificial intelligence, blockchain, analytics, predictive and forensic accounting, and more.

6 Conclusion

The dynamics of information technologies have advanced considerably, therefore, in organizations, steps have been taken to incorporate information technologies into processes, therefore, from the review carried out on the accounting undergraduate study plans. Public education, the incorporation of Emerging Technologies subjects, which are currently required by the business sector, was not evident. With the proposal incorporated in the research, it is intended that it be analyzed by the academic union and the regulatory entities of the Ministry of Education that will help in a certain way to eliminate the barrier that exists from academics

and professional practice.

The process of incorporating the emerging technology subject will require the training of public accounting teachers and the incorporation of junior accountants that will allow the successful execution of the proposed topics.

It is recommended for future research to analyze the learning methods and incorporation of the information systems technology infrastructure in the transmission of knowledge by the public accounting teacher and the achievement of learning results by each of the course participants, as well as the analysis of the impact generated by the different programs of the different universities once the subject is incorporated into the impact on the company.

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