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REVIEW ARTICLE

Reflection on education and laboratory

DISCUSSION ON THE DIDACTIC SPACE OF THE ACCOUNTING LABORATORY IN HIGHER EDUCATION

DISCUSIÓN SOBRE EL ESPACIO DIDÁCTICO DEL LABORATORIO CONTABLE EN LA EDUCACIÓN SUPERIOR

DISCUSSÃO SOBRE O ESPAÇO DE ENSINO DO LABORATÓRIO DE CONTABILIDADE NO ENSINO SUPERIOR

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Abstract

In the field of accounting, the accounting laboratory has gained relevance as a space to develop students' practical and investigative skills, essential for their professional performance. However, it is important to reflect on the nature and objectives of this laboratory, preventing it from becoming a mere technical practice. This article focuses on analyzing the role of the accounting laboratory and examining its meaning in the training of accounting professionals, as well as critically reviewing wrong practices in its implementation. The article adopts an interpretive, conceptual and reflective approach, seeking to evaluate the purpose and essence of the accounting laboratory, and provide conceptual elements to re-evaluate and improve its teaching. Topics such as the differences from competency-based education between the educational space of technological and professional education in accounting are addressed. The results show the existing differences in the educational spaces of the accounting laboratories and accounting workshops.

Keywords: accounting skills; accounting education; accounting teaching; accounting professional training; educational practices in accounting.
JEL: C90; C92; I21; I23; M41

Resumen

En el campo de la contabilidad, el laboratorio contable ha ganado relevancia como un espacio para desarrollar competencias prácticas e investigativas de los estudiantes, fundamentales para su desempeño profesional. Sin embargo, es importante reflexionar sobre la naturaleza y objetivos de este laboratorio, evitando que se convierta en una práctica técnica. Este artículo se enfoca en analizar el papel del laboratorio contable y examinar su sentido en la formación de profesionales contables, así como revisar críticamente prácticas equivocadas en su implementación. El artículo adopta un enfoque interpretativo, conceptual y reflexivo, buscando evaluar el propósito y la esencia del laboratorio contable, y proporcionar elementos conceptuales para reevaluar y mejorar su enseñanza. Se abordan temas como las diferencias desde la educación basada en competencia entre el espacio educativo de la educación tecnológica y profesional en contabilidad. Los resultados muestran las diferencias existentes en los espacios educativos de los laboratorios y talleres contables.

Palabras clave: competencias contables; educación contable; enseñanza de la contabilidad; formación del profesional contable; prácticas educativas en contabilidad.
JEL: C90; C92; I21; I23; M41

Resumo

No campo da contabilidade, o laboratório contábil tem ganhado relevância como espaço para desenvolver as habilidades práticas e investigativas dos alunos, essenciais para o seu desempenho profissional. No entanto, importa reflectir sobre a natureza e os objectivos deste laboratório, evitando que se transforme numa mera prática técnica. Este artigo se concentra em analisar o papel do laboratório de contabilidade e examinar seu significado na formação de profissionais contábeis, bem como revisar criticamente as más práticas em sua implementação. O artigo adota uma abordagem interpretativa, conceitual e reflexiva, buscando avaliar a finalidade e a essência do laboratório de contabilidade, e fornecer elementos conceituais para reavaliar e aprimorar seu ensino. São abordados temas como as diferenças na formação por competências entre o espaço educacional de formação tecnológica e profissional em contabilidade. Os resultados mostram as diferenças existentes nos espaços educativos dos laboratórios e oficinas de contabilidade.

Palavras-chave: habilidades contábeis; educação contábil; ensino contábil; formação profissional contábil; práticas educativas em contabilidade.
JEL: C90; C92; I21; I23; M41

Introduction

The accounting laboratory is related to the promotion of the student's practical and research competences, understanding that they are necessary for the accounting professional practice accomplishment (Galletta, 2015). On the other hand, practice in the accounting laboratory is a knowledge construction process (López y Tamayo, 2012).

The disciplinary contents and the knowledge conceptualization in the laboratories in the areas of sciences, engineering and humanities are constantly rebuilt and reconsidered and include computer technologies to advance in their teaching-learning didactic processes (Amaya, 2012; Morales, 2015; Torres y Martínez, 2015). Some researchers in exact sciences such as biology, chemistry, physics and also in engineering, economics and humanities are constantly discussing teaching-learning practices in the laboratory educational space due to their relevance for the integrating theory and practice process (Álvarez y Carlino, 2004; Barberá y Valdés, 1996; Cardona, 2013; Coronel y Curotto, 2008; Durango, 2015; Espinosa et al., 2016; Flores et al., 2009; López y Tamayo, 2012; Romero y Quesada, 2014; Tenreiro y Marques, 2006).

In accounting, the concept of laboratory is a pedagogical and didactic process under construction, relatively new compared to other disciplines. Therefore, the accounting laboratory disciplinary content academic consideration is relevant and meaningful for universities. The accounting laboratory is generally analyzed as a space to develop the public accountants' technical practice. Nevertheless, according to Flores et al. (2009) when practice becomes instructional, behaviorist and technical, it moves away from the laboratory purpose and goals.

Therefore, this article's aim is to analyze the accounting laboratory performance, which was carried out under an interpretative, conceptual and reflective approach, which seeks to evaluate the laboratory and / or workshop significance in accounting professional training, in addition, to review

the criticisms of the wrong practices in the laboratory. This can provide conceptual elements to reorder the idea and rethink on how the accounting laboratory work is, or it should be in this profession teaching.

The first part of this article exposes the differences between the work space of technological and professional education in accounting. In the second part, the methodology of the work is proposed. The third part presents the differences that the methodology assumes by competences in compliance with the secondary and professional education objectives. The fourth part shows the differences between the laboratory and the workshop as educational spaces for practical activities based on know-how. The fifth part concerns conflicts and confusions in technological and vocational education. Finally, it is shown how these contradictions and concepts have affected the accounting laboratory educational spaces in higher education, and subsequently, strategies are proposed to contribute to the accounting laboratory improvement to help the accounting professional's competence development.

Methodology

This article is developed under an interpretative approach; it focuses on the "human actions and social life meaning analysis" (Schuster et al., 2013, p. 13). This makes it possible to understand situations and determine concepts, since it is based on the theoretical-practical relationships that accounting students face at the professional and technical levels in the development of their job. In this case, the literature review is used to address the laboratory and workshop concepts as an interpretative activity that allows to specify its intention through the decomposition of the elements that articulate the concept (Álvarez, 2011).

Additionally, it aims to contrast the theoretical purpose of its application in the educational field, to understand the practical meaning in relation to the process actors: the students. It should be understood that the concept of hermeneutical interpretation is valid to analyze the meaning and contribute to the meaning construction (Hermanus, 2013), so that is to comprehend and establish coherence between what it is, what it is said, and what it is done.

This article, for the conceptual analysis, result consequences and conclusions, uses a reflection methodology (Ash & Clayton, 2009), which is a systematic approach to think critically about personal experience in order to understand a certain problem (Schön, 1983). The reflection methodology usually involves the following steps: description, analysis, evaluation and planning of the problem (Boud et al., 2013).

Therefore, this work first describes the problems in higher education in the accounting laboratory place in Public Accounting teaching, focused on the competence-based education theory. Subsequently, the term laboratory is conceptualized and analyzed through a review of different areas of knowledge that have successfully integrated the laboratory space into their teaching-learning process. Finally, it evaluates and sets out the secondary and higher education competences and requirements, with the concepts of laboratory in accounting knowledge, to understand what the duty of this space is in the accounting professional teaching-learning process.

Results

Differences between technological and professional accounting education

Every accounting practice implicitly has a theory; in the educational field, the theoretical foundation and accounting practice make up two autonomous realities that lead to knowledge from different perspectives. The first is the theoretical conception, which explains and reflects on the procedures, steps, results and formulates a causality process (Goertz & Levy, 2007; Mackie, 1965; Ponce y Muñoz, 2014). Professional thinking uses theoretical reflection to understand, design and redesign the practical process. Practice is identified with what is daily, useful, immediate and functional (Lieberman y Miller, 2003).

The second perspective is a functional one, where practice is understood as a technical and instrumental activity, limited to being a simple theory application; it has been a trend in practical education, giving rise to a relationship of subordination of one over the other (Coll, 2010). However, the practical approach is not outside the theoretical one; therefore, it could be considered that they are complementary. Although professional thinking uses theoretical reflection to design

and retrace the practical process, the latter can also rethink the theory resulting from causality changes.

When the professional does not have the theoretical elements to reflect on the procedure application, it is not within the professional practice, but in the simple technical activity. The practice "teaches the way of doing something, thinking or acting, adjusting to reality and normally pursuing a useful end" (Real Academia Española, s.f.); it is generally contextualized in the theoretical and conceptual foundations of the respective knowledge area.

Technical education, in itself, trains in the drill performance, important in obtaining a result. But when the context changes, the causality variables and the user needs can affect the procedure improvement and change the practice, which forces the technique to change.

Doing a task with technique requires repetition, usually making use of significant time to develop skills and execute tasks with care and quality. An experienced person in a technical field had a practice term where he acquired efficiency and meticulousness in his work. Therefore, knowing the practice does not make it technical. Agility is a key element in the technique; it determines the expertise in the practical steps and procedures.

The accounting professional, public accountant, must have practical knowledge, but not only in technical work. It is necessary to develop thinking skills and to readjust the procedures. In case the purposes change, perform those calculations that are not common and that are required for accounting, financial, commercial, labor, and tax analysis, among others. Therefore, to develop in professional tasks, it takes time to understand and reflect critically and responsibly on practical procedures.

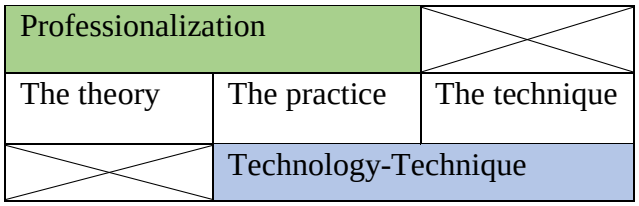
Professional or technological development requires practice, but it must have a different approach according to what each of them develops. The first one reflects on it, designs it, redesigns it, evaluates it, validates it, audits it, analyzes it, understands it, and interprets it, and the second one executes it in an agile, stealthy and efficient way. Although they are directly related, they have an

important cognitive, metacognitive, academic and work distinction that requires different competences.

Comprehension and interpretation entail the metacognitive, investigative and systemic study of knowledge in the accounting knowledge area, a topic to which academic and financial time is dedicated that is demanded to achieve these competences (Rincón y Sánchez, 2011).

Figure 1

Dominance towards theory versus practice



Source: own elaboration.

The technical-technological work context requires less academic and financial investment; these programs are often of main interest for those who do not want or cannot invest in vocational training. In Colombia, technological advances are leading to a change in the demand for professionals in the country; there could be much more demand for technicians and technologists than professionals (Ministry of National Education, 2016). On the other hand, professional work has greater civil formality, and it is a job with great responsibility, obligations and commitments.

There is a need and relationship between these two forms of accounting professionalization; however, the problem comes from the educational context, where there is no clarity about the type of competences. Students of technological careers complain when the academic process is too theoretical because they demand more technical knowledge for job development since their work context needs agility framed in technical works[1] and not any reflection on these. The same happens

in professional academic processes with very technical methodologies, which do not provide elements to critically analyze the changing context (Michelsen, 2013).

Separation of competences in secondary education (technological) and higher education (professional)

The model of education by competences, like pedagogy by objectives, is generally related to job skills: know-how (Gómez, 2005; Sacristán, 1982; Tobón, 2007).

According to, Sanz (2010):

> It can also be understood as a combination of skills, knowledge, attitudes and behaviors aimed at the correct execution of a task in a defined context (...) but, according to Tobón (2006) the complex approach to competences includes elements beyond the basic labor component. The fact that there are educational institutions that give priority to work is not typical of the skills approach, but of their educational project or an inadequate conception of this approach. (pp. 6-7)

Another important competence for well-rounded education is knowing how to be, that is, the ability to interact with other people, having attitudes and values with which to live in society, working in a team, acting ethically and supporting others. "Competences are complex processes of performance in the face of problems with suitability and ethical commitment and are framed in comprehensive training" (Tobón, 2007, p. 14).

On the other hand, Roncancio et al. (2015) take the word "capacity" from Chomsky to specify the term of competence. The capacity like a skill to solve or do a specific activity that, in many cases,

[1] For example, on the results -specifically in accounting and auditing- of the visit made by the World Bank delegates on July 19, 2012 for the ROSC report in Colombia, Zuluaga (2012) states:

> The most urgent thing to improve is university training, which unfortunately is leveling down, due to the predominance of technical and technological training entities that escalate to the undergraduate level, which is equally deficient, because economic interest predominates over training.

is evaluated based on “The exercise of responding effectively to the demands of professional practice" (Silva, 2008, p. 778). Therefore, separating technical and/or technological study (secondary education) and professional study (higher education) is based on the competence value and the ability to perform tasks with different levels of complexity.

In the workplace, the responsibilities are different for each level of study. It is not the same to teach the concept of transaction of an asset, to be able to recognize it in the accounting software correctly, and to have the ability to perform impact financial analysis of the transaction within the maintenance of financial and physical capital of the organization.

Another accounting professional feature is the ethical responsibility with which he provides certainty about the information presented to users, highlighting the competence development of knowing how to be, in addition, to know how to do. "From the complex approach, education is not reduced exclusively to forming competences but aims to form holistic people with a sense of life, artistic expression, spirituality, self-awareness and values” (Tobón, 2007, p. 15).

> Competence-based training stands as one of the models that best contributes to the learning process, as it allows potential professional accountants to develop the skills, abilities and attitudes necessary to enter successfully in the labor market. (Dextre, 2013, p. 35)

The International Standards of Education (ISE), issued by the International Federation of Accountants (IFAC), incorporate the concept of competence-based training as a methodology to define accounting professional education objectives, formalizing the capabilities to address practical tasks (Castillo et al., 2014). The ISE state that professional accountant knowledge needs to be sufficiently advanced in order to have competences in a complex and changing environment (IFAC, 2008, p. 22). They must manipulate both theoretical and practical knowledge to apply it in an analytical and methodical way, which allows them to prequalify with skills to be managers, designers or evaluators of information systems.

The accounting professional needs the intellectual capacity to solve problems, conflicts, analyze risks, self-manage, delegate tasks, manage people and resources, plan strategies, manage projects,

make decisions, defend positions effectively, have critical thinking, negotiate solutions and exercise good judgment in complex situations (Rojas, 2015).

For the IFAC, the student practical education is way too relevant, which should be based on the competences established in the training manual, which allows an experience in the skills directly related to accounting professionals. “The IFAC defends the professional internships existence and recommends professional practice spaces during the academic training period" (Roncancio et al., 2015, p. 48).

Competence-based education, based on the three columns, knowing, knowing how to be and knowing how to do, develops the theoretical, attitudinal and procedural contents (Sánchez, 2005). On the other hand, for Delors (1996), “they are divided into four pillars: learning to know, learning to do, learning to live together, and learning to be”. "Three essential dimensions of competences can be recognized: knowledge (knowing), skills (knowing how to do) and attitudes (knowing how to be); for some educators and thinkers, knowing how to live together is part of knowing how to be” (Jara y Stiepovi, 2007, p. 125).

For Jiménez et al. (2011) well-rounded education includes being, knowing, feeling, knowing how to do and knowing how to express oneself, which is an integration between knowing, doing and being. The competence concept is evidenced in doing in context, where it is evaluated in a type of empirical performance in a specific situation (Roncancio et al., 2015; Valero et al., 2013).

Although the competence model expresses a direct correspondence in doing, knowing and knowing how to be, it is the academic approach that bases the specific tendency in one of these, mainly between theory and practice (knowing and knowing how to do). The objective of technical and technological education is dominated by practical knowledge, and the objective of professional education is guided to theoretical knowledge, towards the systemic understanding phenomena on which we work (Cardona et al., 2016).

Taking into account the previous considerations, it is proposed for this work comprehension to analyze the prevalence degree in professional, technological and technical competences,

characterized in four pillars: knowing how to be, knowing, knowing-doing and doing. Professionalization should strengthen the skill development on knowledge and know-how, where there is a relationship between theoretical and practical knowledge. The technological areas must nurture a competence of know-how towards doing.

The predominance of doing, in technical-technological education, is relevant because it promotes the formation of a professional capable of developing his work efficiently, knowing the procedures, using technology, and using tools and instruments appropriately that contributes to the fulfillment of business planning[2].

Figure 2 shows the predominance of knowing versus doing.

Figure 2

Predominance of knowledge against the doing

<table>
<tr><td colspan="2">Professionalization</td><td></td></tr>
<tr><td>The theory</td><td>The practice</td><td>The technique</td></tr>
<tr><td colspan="3">Knowing how to be</td></tr>
<tr><td>Know</td><td>Know-how</td><td>Do</td></tr>
<tr><td></td><td colspan="2">Technology-Technique</td></tr>
</table>

Source: own elaboration.

In education of accounting professionals, practical teaching prevails, in some cases, with a high content of technicality and with little theory influence and theoretical practice (Gómez, 2006). This

[2] In the propaedeutic model of secondary education, tertiary education is proposed. It is not a leap to university professionalization. They are technical specializations and master's degrees, for technologists with the intention of training middle positions, with tools and technologies that will support them in improving their work efficiency (International Bank for Reconstruction and Development, 2003; Ministry of Education, 2015). ProfessionalizationTheoryThe practiceThe practiceThe techniqueKnowing how to beKnowingKnowing how to doTechnology-Technique.

can be understood as a result of its historical evolution, the economic organizations influence where technical results prevail, as well as the public accountant professional education reflection lackness. The teaching-learning-evaluation processes are impregnated with these setbacks, usually the competencies of the practical work of the accounting professional are equalized with the practical competencies performed by the technician or technologist. Issue that impacts on the different academic processes, in this case study: in the laboratory.

The didactics of the laboratory and the workshop

"It has been almost three hundred years since John Locke saw the need for students to do practical work in their education, and at the end of the nineteenth century it was already an integral part of the science curriculum in England and the United States" (Barberá, 2002) Since then, this fact has been maintained, assumed in the great importance of practical work for science teaching.

The workshop and the laboratory are related because both contribute to the practice. It is a meeting place of knowledge and doing. Some authors do not show a difference between the didactics of the workshop and the laboratory, rather, they are proposed as spaces for research, where practical-theoretical processes are developed, in a constructivist way (Duque et al., 2016; Rodríguez, 2012).

However, the laboratory and workshop have very marked tendencies that make them different. As can be seen in Figure 3, practice prevails in the workshop with a tendency more to learn-to-do, than to know. On the other hand, in the laboratory, knowledge predominates more than doing, being a practice marked by theory.

Figure3

Educational objectives of the laboratory against the workshop

<table>
<tr><td colspan="2">Professionalization</td><td></td></tr>
<tr><td colspan="2">Laboratory
Experimentation, theory validation, testing, critical thinking, problem solving.</td><td></td></tr>
<tr><td>The theory</td><td>The practice</td><td>The technique</td></tr>
<tr><td>Know</td><td>Know-how</td><td>Do</td></tr>
<tr><td></td><td colspan="2">Workshop
Efficiency of tasks and activities, use of tools and instruments, management of computer applications.</td></tr>
<tr><td></td><td colspan="2">Technology</td></tr>
</table>

Source: own elaboration

Laboratory practice without the verification of knowledge is not a laboratory exercise, it would be the follow-up of steps to a doing, a recipe, which does not contribute to the comprehensive growth of knowledge (Durango, 2015; López y Tamayo, 2012; Romero y Quesada, 2014). According to Cardona (2013) “Many students think that the purpose of laboratory work is to follow instructions and get the correct answer, so they concentrate on the idea of manipulating instruments more than handling ideas” (p. 7). The laboratory is a space for experimentation, where the reality of ideas, concepts, theories, paradigms and others are contrasted, through practical exercises, guided by the teacher. “The important thing is that there is an opportunity for discovery, exploration and consolidation of knowledge” (Galetto y Romano, 2012, p. 27).

The educational space of the laboratory is based on objectives. "Laboratories have been used as a teaching-learning mechanism, a bridge between theory and real practice” (Quiroga et al., 2013, p. 1). Students collect investigative, projective, analytical skills, create their own judgments based on the previous ideas and those they build after practice, prepare scientific reports that support their

judgments (Agudelo y García, 2010). "Laboratories allow a greater appropriation of knowledge" (Quiroga et al., 2013, p. 7).

The educational laboratory is not necessarily a physical place, it is an academic space where students observe, experiment, feel, contemplate, reflect, conclude the relationship between theory and practice, about the knowledge that requires their competence. An educational laboratory can be made with instruments and tools that emulate reality, with virtual simulators (López y Tamayo, 2012; Morales, 2015).

In the educational space of the laboratory, theory should not be implicit, but should be an explicit resource, in order to interpret, understand and analyze the practical process (Cardona, 2013; Morales, 2015; Romero y Quesada, 2014; Sánchez, 1990; Tenreiro y Marques, 2006). The laboratory supports the strength of skills for conflict resolution, judgment-making and scientific attitude. "We agree that in the laboratory the learning of the methodological domain predominates in an indissoluble interrelation with some theoretical framework of reference associated with the situation posed" (Andrés et al., 2008, p. 344).

> Laboratory practices as a didactic strategy that, when used from the constructivist theoretical framework, promotes students to achieve the construction of school scientific knowledge and achieve the development of scientific competencies, promoting greater autonomy and participation by students. (Espinosa et al., 2016, p. 267)

Technical-technological education feeds the predominance of know-how, its relationship with the use and manipulation of instruments, for the performance of tasks in industrial and commercial activities, is a concise objective of its academic process. The student needs to carry out internships that will support the efficiency of the tools, which are directly related to the competencies expected by their employers.

> Within the framework of technical education, a workshop is the field of work in which a teaching-learning process is carried out, for academic purposes so that the student develops skills, attitudes and aptitudes that take into account knowledge and training for job

> performance. On the other hand, a laboratory in education is an area of practical teaching in which the knowledge taught theoretically is reaffirmed with tangible demonstrations that help the student to relate the classes to the real world. (Duque et al., 2016)

"The workshop allows to construct the concepts and/or learnings by means of" doing"" (Rios y Cubillos, 2011, p. 40). The practice - which enables the know-how - is an important process for the demonstration of technical skills, because it manifests itself in the ability to carry out the actions and actions of the concrete situations (Sanz, 2010). "A workshop is not conceived where practical, manual or intellectual activities are not carried out" (Duque et al., 2016). The workshop is not limited to know-how, but has almost always manifested the prevalence of doing; the results of the evaluation of the workshops are measured by the technical skills and concrete assessments.

In professional education, the understanding of knowledge is required, the knowledge of the systemic relationship of the variables of the studied phenomena. The questions, about the: "why", "for what", "what", are indispensable to interpret the categorical elements of the discipline. The resolution of these questions formalizes the causality properties of the studied elements. The practice demands other questions: "to whom", "how", "who", "where"; determinants for the realization of the "doing".

The confusion in teaching-learning in accounting between technology and professionalization

The competency-based approach to teaching-learning in technological programs, demands to have strong tendencies to the labor competencies of the functionalist and mechanistic approach, which are framed in defined activities and tasks where students must generate skills in technical functions that allow them to stand out laborally, by the quantity and quality of an efficient job (Duque et al., 2016). The technical activity is standardized, formalized, marked, so someone who knows how to follow the process competently is required.

The professional, on the other hand, is the one who has the ability to design the standardization and formalization of the activities carried out by the technician, to fulfill the systemic purposes. Must be a critic, theorist, analyst, observer, researcher, innovator, creative, intellectual of the activity.

The focus of the professional program needs to have a high tendency to the model of complex thinking competencies (Tobón, 2007).

The scope and purposes of the accounting subjects that are seen in technology, should not be the same as those studied by the professional; it is assumed that they have different competencies. The first seeks technical skills; the second, competencies that allow them to discuss complex problem solving, design and evaluate the information system and address the development of accounting projects.

The accounting laboratory in higher education

The reflection on the competencies of an accounting professional places the Public Accountant within a high cognitive and metacognitive level, based on the work needs that they should meet in the organization (IFAC, 2008). But the teaching-learning process is very technified (standardized) in some subjects. The theoretical-practical relationship is poorly understood and explained.

The subject of the laboratory is the space par excellence to locate the stumbling block of the union of theory and practice. The meaning of laboratory - whether in the natural sciences or in the social sciences, indifferently - is the place of experimentation, observation and validation of theory, with respect to practice.

The accounting laboratory is related to the promotion of the student's research skills, understanding that research skills are necessary for the accounting profession in carrying out its practical work, promoting problem-solving skills to identify the key concepts of standards, regulations, academic and scientific publications that can support the formulation of judgments and be able to manipulate a large amount of data, with which he can draw conclusions (Galletta, 2015).

The educational space of the laboratory is to test, experiment, validate theories, standards and norms on a micro and macro scale in economic, political and social terms, to learn by experimenting, make mistakes and formulate constructivist didactics where the student carries out

an active learning process. For this reason, the laboratory is closer to research practice than to technical practice.

On the other hand, the educational space of the accounting workshop is to exercise practical knowledge, learn by doing, acquire skills in the handling of tools, processes and technological instruments. It trains the individual in the appropriate procedures to perform the standardized tasks, with the respective quality and efficiency that is expected of a person skilled in technical work.

The educational dynamics of the laboratory and the workshop can be carried out in the real space of the companies. But it is different from ordinary work. The workshop as an educational space does not require a supervisor, but an instructor and the student is expected to become skilled in tasks and exercises of technique and other elements that are planned in the teaching process.

The internship in the company can also be a laboratory, which the student takes as a place where he will observe, check and validate theories, while working. The student reflects on the workspace, verifies the variables and their behaviors and analyzes the causality. He needs a teacher guide, who will help him to make visible and analyze the phenomena, make them explicit, reduced to the light of theory, in some predictable situations.

Discussion

This work separates and differentiates two key areas of practical accounting education, laboratories and workshops. The accounting laboratory focuses on the theoretical-practical relationship, knowledge and know-how. The workshop focuses on mastery in practice-technique: know-how and doing. Within the educational objective of the laboratory is the confirmation of the theory through practice. In the dynamics of the workshop, it may or may not have theories, its foundation in doing, does not require the inclusion of the theoretical relationship to practice, for the results of technical learning.

The accounting laboratory, on many occasions, is a space where one learns to use a tool, a software, through different didactic methodologies such as emulating a company, role-playing, etc., however, it usually does not encourage practical-theoretical reflection.

Unlike what is usually done, the accounting laboratory space is a place to stimulate accounting thinking, understanding and experimentation of accounting practice, where theories, t-theories,[3] concepts, regulations, standards and other elements with which accounting is worked and thought can be validated. In the laboratory, as an accounting practice, business simulations are carried out, it is a space for constructivist learning, this means that the teaching-learning dynamics propose the active action of the student, who can arrive with: ill-advised knowledge, disoriented, with uncertainties, doubts, motivated, curious, indiscreet, inquirer; which leads him to act, make mistakes, observe causalities and build knowledge.

A laboratory space that usually remains in the theoretical without practical application or that focuses on practice without theoretical relationship, are both discrepancies with respect to the educational objective of the laboratory (Flores et al., 2009). The teachers of accounting subjects in universities present a very polarized domain, between those who handle practical experience and theoretical ones. Generally, they do not converge in meeting spaces (Cardona et al., 2016). As the accounting laboratory concession is conceived as excessively technical, the space is positioned to practical teachers, who have technical expertise in accounting software (Cardona et al., 2016). Commonly, the participation of teachers with theoretical mastery in the laboratory space is imperceptible.

The accounting laboratory, should be par excellence, the meeting space between teachers with practical and theoretical mastery. In this space, teachers with different experiences should come together, to define through practice, which will be the didactics, exercises and dynamics that can lead the student to a construction and affirmation of the theory, to assume the competencies of an accounting professional.

[3] Relationships with other theories from other disciplines such as management, economics, psychology, philosophy, industrial engineering, systems, etc., which can interact transdisciplinarily with accounting (Lemos, 2008).

> A change in our teaching practice in the laboratory should involve efforts aimed at new experiences in which it is worthwhile to adjust time, resources, didactic contents and attitudes to give the laboratory the place it claims in the learning of science. (Flores et al., 2009, p. 103)

Conclusions

The space of the accounting laboratory is the ideal meeting place, par excellence, for teachers with both technical and theoretical mastery, where they must create teaching methodologies that lead the student to the explicit understanding of the theories, through practical exercises. The micro-curriculum of public accounting programs must review, evaluate and rethink the exercise that is being developed in the area of its accounting laboratories. This article is novel, because it raises a debate on the subject of the accounting laboratory, an issue that requires to be analyzed in a transdisciplinary and interdisciplinary way. In order to establish a broader understanding that allows to give relevance and importance to the exercise of laboratory development as a key support focus in the students' learning process.

Laboratory practices constitute an effective space for theoretical testing. In addition to the above, this article provides, for future studies, a point of view on the importance of the accounting laboratory through a reflective documentary analysis, all this in order to observe the criticisms and polemics of inappropriate laboratory practices, providing useful conceptual elements to rearrange the concept and debate about how is or should be the work of the accounting laboratory in the teaching of Public Accounting.

Ethical considerations

The research did not require an ethical endorsement, since it is an analysis that is born from a documentary review and the motivation of the study on the subject from the authors.

Conflict of interest

All authors made significant contributions to the document and declare that there is no conflict of interest related to the article.

Authors' Contribution Statement

Carlos Augusto Rincón Soto: conceptualization, validation, methodology, research, writing and original draft, revision, visualization. Francisco Ricardo Molina Mora: conceptualization, validation, methodology, research, writing and original draft, revision, visualization. Omar Javier Solano Rodríguez: conceptualization, validation, methodology, research, writing and original draft, revision, visualization. Jorge Lemos de La Cruz: conceptualization, validation, methodology, research, writing and original draft, revision, visualization.

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References

(1) Agudelo, J. y García, G. (2010). Aprendizaje significativo a partir de prácticas de laboratorio de precisión. *Latin-American Journal of Physics Education*, *4*(1), 149–152. http://dialnet.unirioja.es/servlet/articulo?codigo=3694950

(2) Ash, S. L. & Clayton, P. H. (2009). Generating, deepening, and documenting learning: The power of critical reflection in applied learning. *Journal of Applied Learning in Higher Education, 1*(1), 25-48.

(3) Álvarez, E. (2011). La cuestión del sujeto en la fenomenología de Husserl. *Investigaciones Fenomenológicas*, (8), 97–149. https://www2.uned.es/dpto_fim/InvFen/InvFen08/pdf/07_ALVAREZ.pdf

(4) Álvarez, S. y Carlino, P. (2004). La distancia que separa las concepciones didácticas de lo que se hace en clase: el caso de los trabajos de laboratorio en biología. *Enseñanza de las Ciencias*, *22*(2), 251–261.

(5) Amaya, A. (2012). Simulación clínica y aprendizaje emocional. *Revista Colombiana Psiquiatria*, *41*, 44–51.

(6) Andrés, M., Pesa, M. y Meneses, J. (2008). Efectividad de un laboratorio guiado por el modelo de aprendizaje MATLAF para el desarrollo conceptual asociado a tareas experimentales. *Enseñanza de las Ciencias*, *26*(3), 343–358.

(7) Banco Internacional de Reconstrucción y Fomento. (2003). *La educación terciaria en Colombia. Preparar el terreno para su reforma.* Banco Mundial. Washington. http://web.worldbank.org/archive/website00905D/WEB/PDF/1EDUCACI.PDF

(8) Barberá, Ó. (2002). El Área de 'Didáctica de las Ciencias Experimentales': ¿apuesta de futuro o error del pasado? *Revista de Educación*, (328), 97-109. https://redined.educacion.gob.es/xmlui/handle/11162/66942

(9) Barberá, O. y Valdés, P. (1996). El trabajo práctico en la enseñanza de las ciencias: una revisión. *Enseñanza de las Ciencias*, *14*(3), 365-379. https://raco.cat/index.php/Ensenanza/article/view/21466/93439

(10) Boud, D., Keogh, R. & Walker, D. (Ed). (2013). *Reflection: Turning experience into learning*. RoutledgeFalmer.

(11) Cardona, F. (2013). *Las prácticas de laboratorio como estrategia didáctica*. [Tesis de pregrado, Universidad del Valle]. Repositorio Institucional. https://bibliotecadigital.univalle.edu.co/bitstream/handle/10893/6772/CD-0395428.pdf;jsessionid=A73818F3A9A87AF0A6C20DE0453CC572?sequence=1

(12) Cardona, L., Varón, M., Bonilla, I. y Rincón, C. (2016). El "ser docente" en contabilidad. *Revista Libre Empresa*, *13*(2), 103-123.

(13) Castillo, C., Córdoba, J. X. y Villarreal, J. L. (2014). Estándares internacionales de educación (IES) en contabilidad y aseguramiento: nuevos retos de la profesión contable. *Tendencias, 15*(2), 118-135. https://revistas.udenar.edu.co/index.php/rtend/article/view/2049

(14) Coll, C. (2010). The centrality of practice and the duality between theoretical and practical knowledge. *Journal for the Study of Education and Development*, *33*(2), 151–159. https://doi.org/10.1174/021037010791114553

(15) Coronel, M. y Curotto, M. (2008). La resolución de problemas como estrategia de enseñanza y aprendizaje. *Revista Electrónica de Enseñanza de las Ciencias*, *7*(2), 463–479.

(16) Delors, J. (1996). La educacion o la utopía necesaria. En J. Delors, I. Al Mufti, I. Amagi, R. Carneiro, F. Chung, B. Geremek, W. Gorham, A. Kornhauser, M. Manley, M. Padrón, M. Savane, K. Singh, R. Stavenhagen, S. Myong y Z. Nazhao. *Informe a la Unesco de la comisión internacional sobre la educación para el siglo XXI: La educación encierra un tesoro.* (pp. 07-34). Ediciones UNESCO. https://repositorio.minedu.gob.pe/bitstream/handle/20.500.12799/1847/La%20educacion%20encierra%20un%20tesoro.pdf?sequence=1&isAllowed=y

(17) Dextre, J. (2013). Los retos de la formación por competencias del contador público. *Contabilidad y Negocios*, *8*(16), 35-47.

(18) Duque, J., Cedillo, M. y Buchelli, L. (2016). Los talleres en las universidades como una alternativa y/o complemento para el desarrollo del conocimiento. En M. R. Tolozano. (Coord.), *Memorias del segundo congreso internacional de pedagógicas* (pp. 208-219). Universidad Estatal de Milagro.

(19) Durango, P. (2015). *Las prácticas de laboratorio como una estrategia didáctica alternativa para desarrollar las competencias básicas en el proceso de enseñanza-aprendizaje de la química* [Tesis de maestría, Universidad Nacional de Colombia]. Repositorio Institucional. https://repositorio.unal.edu.co/handle/unal/54498

(20) Espinosa, E., González, K. y Hernández, L. (2016). Las prácticas de laboratorio: una estrategia didáctica en la construcción de conocimiento científico escolar. *Entramado, 12*(1), 266–281.

(21) Federación Internacional de Contadores [IFAC]. (2008). *Manual de los pronunciamientos internacionales de formación*. New York. http://www.ifac.org/system/files/downloads/Spanish_Translation_Normas_Internacionales_de_Formacion_2008.pdf

(22) Flores, J., Caballero, M. y Moreira, M. (2009). El laboratorio en la enseñanza de las ciencias: Una visión integral en este complejo ambiente de aprendizaje. *Revista de Investigación*, *33*(68), 75-111. http://www.scielo.org.ve/pdf/ri/v33n68/art05.pdf

(23) Galetto, M. y Romano, A. (2012). *Experimentar: Aplicación del método científico a la construcción del conocimiento*. Narcea Ediciones.

(24) Galletta, P. (2015). Challenges and opportunities in teaching accounting research. *Journal of*

Accounting and Finance, *15*(6), 85-103. http://m.www.na-businesspress.com/JAF/GallettaPZ_Web15_6_.pdf

(25) Goertz, G. & Levy, J. (Ed.). (2007). Causal explanation, necessary conditions, and case estudies. In *Explaining War and Peace. Case Studies and Necessary Condition Counterfactuals* (pp. 9-45). Routledge.

(26) Gómez, I. (2005). Competencias profesionales: una propuesta de evaluación para las Facultades de Ciencias. *Educación y Educadores*, *8*, 45–66. https://educacionyeducadores.unisabana.edu.co/index.php/eye/article/view/565/656

(27) Gómez, M. (2006). Comentarios sobre el aprendizaje-construcción de la teoría contable. *Lúmina*, *7*, 129–153.

(28) Hermanus, J. (2013). La hermenéutica según Hans-Georg Gadamer y su aporte a la educación. *Sophia, Colección de Filosofía de la Educación*, (15), 33-84. https://www.redalyc.org/pdf/4418/441846100002.pdf

(29) Jara, P. y Stiepovi, J. (2007). Currículo por competencias en el postgrado de enfermería. *Investigación y Educación en Enfermería*, *15*(2), 122–129. http://www.scielo.org.co/pdf/iee/v25n2/v25n2a12.pdf

(30) Jiménez, T., Díaz, B. y Catalá, O. (2011). La preparación para la culminación de estudios de Contabilidad y Finanzas de la SUM, Cabaiguán, Cuba. *Revista Iberoamericana de Educación Superior*, *2*(5), 126–140. https://www.ries.universia.unam.mx/index.php/ries/article/view/50/196

(31) Lemos, J. (2008). *Límites de la representación contable en la estructura fundamental de la partida doble, las nociones de intercambio, valor, precio y medición*. Universidad del Valle.

(32) Lieberman, A. y Miller, L. (Coords.). (2003). *La indagación como base de la formación del profesorado y la mejora de la educación*. Barcelona-España: Octaedro. https://dialnet.unirioja.es/servlet/libro?codigo=3987

(33) López, A. y Tamayo, Ó. (2012). Las prácticas de laboratorio en la enseñanza de las ciencias naturales. *Revista Latinoamericana de Estudios Educativos*, *8*(1), 145-166.

(34) Mackie, J. (1965). Causes and Conditions. *American Philosphical Quarterly*, *2*(4), 245–264. https://www.jstor.org/stable/20009173

(35) Michelsen, P. (2013). Requiem por la Educación Superior Tecnológica en Colombia. *POLIANTEA*, *1*(1), 8–17. https://doi.org/10.15765/plnt.v1i1.384

(36) Ministerio de Educación Nacional. (2016). *Perfil Académico y Condiciones de*

Empleabilidad: Graduados de Educación Superior (2001-2014).

(37) Ministerio de Educación. (2015). *Documento bases para la construcción de los lineamientos de política pública del sistema nacional de educación terciaría*. Bogotá-Colombia: Ministerio de Educación Nacional. https://www.mineducacion.gov.co/1759/articles-345485_anexo1.pdf

(38) Morales, C. (2015). *Los laboratorios virtuales como una estrategia para la enseñanza-aprendizaje del concepto de cambio químico en los estudiantes de grado octavo de la institución educativa Marco Fidel Suárez de la Dorada Caldas* [Tesis de maestría, Universidad Nacional de Colombia]. Repositorio Institucional. https://repositorio.unal.edu.co/handle/unal/53936

(39) Ponce, A. y Muñoz, H. (2014). La causalidad desde Hume a Kant: de la disolución absoluta del concepto a su constitución como ley. *Praxis Filosófica*, (38), 7–25. http://www.scielo.org.co/pdf/pafi/n38/n38a01.pdf

(40) Quiroga, G., Alvarado, J., Garcia, J., Niño, J., Barragan, G. y Hazbon, O. (2013).Del aula a la realidad. La importancia de los laboratorios en la formación del ingeniero. Caso de estudio: Ingeniería Aeronáutica–Universidad Pontificia Bolivariana. *World Engineering Education Forum 2013*. https://acofipapers.org/index.php/eiei/article/view/1428

(41) Real Academia Española. (s.f.). Práctica. *Diccionario de la lengua española*. http://dle.rae.es/srv/fetch?id=TtEMsxJ

(42) Rincón, C. y Sánchez, X. (2011). Pensamiento sistémico contable, planteado desde la ingeniería contable. *Gestión y Desarrollo*, *8*(1), 155-174.

(43) Rios, J. y Cubillos, C. (2011). *El taller productivo como estrategia educativa para la promoción de la formación, ocupación, y la participación social de adultos mayores en contextos no formales* [Tesis de maestría, Universidad Pedagógica Nacional]. Repositorio Institucional. http://repository.cinde.org.co/bitstream/handle/20.500.11907/1468/RiosMunozCubillosHernandez2011.pdf?sequence=1

(44) Rodríguez, M. (2012). El taller: una estrategia para aprender, enseñar e investigar. En S. Solier. (Comp.), *Lenguaje y Educación: Perspectivas metodológicas y teóricas para su estudio* (pp. 13-45).Universidad Distrital Francisco José de Caldas. https://die.udistrital.edu.co/sites/default/files/doctorado_ud/publicaciones/lenguaje_y_educacion_perspectivas_metodologicas_y_teoricas_para_su_estudio.pdf

(45) Rojas, W. (2015). Lectoescritura y pensamiento crítico: desafío de la educación contable. *Cuadernos de Contabilidad*, *16*(41), 307–328. https://doi.org/10.11144/Javeriana.cc16-

41.lpcd

(46) Romero, M. y Quesada, A. (2014). Nuevas tecnologías y aprendizaje significativo de las ciencias. ICT and meaningful science learning. *Enseñanza de las Ciencias*, *32*(1), 101-115. https://doi.org/10.5565/rev/ensciencias.433

(47) Roncancio, Á., Mojica, H. y Villamil, D. (2015). Las competencias de formación en contabilidad, el caso de Colombia. *Revista Finnova, 1*(1), 43-60. https://www.researchgate.net/publication/284552214

(48) Sacristán, J. G. (1982). *La pedagogía por objetivos: Obsesión por la eficiencia* (6ta ed.). Madrid: Morata.

(49) Sánchez, G. (1990). La relación teoría-práctica, otra faceta de la formación integral. *Ingeniería e Investigación*, (21), 58-67. https://repositorio.unal.edu.co/handle/unal/32919

(50) Sánchez, L. (2005). Los tres pilares de la educación y el papel del maestro en el taller de habilidades de pensamiento crítico y creativo. *Procesos Psicológicos y Sociales*, *1*(1), 1-9.

(51) Sanz, M. (2010). *Competencias cognitivas en educación superior* (2da ed.).Ediciones de la U. Madrid.

(52) Schuster, A., Punete, M., Andrada, O. y Maiza, M. (2013). La metodología cualitativa, herramienta para investigar los fenómenos que ocurren en el aula. La investigación Educativa. *Revista Electrónica (1) Iberoamericana de Educación en Ciencias y Tecnología*, *4*(2), 109-139. https://exactas.unca.edu.ar/riecyt/VOL%204%20NUM%202/TEXTO%207.pdf

(53) Silva, M. (2008). ¿Contribuye la universidad tecnológica a formar las competencias necesarias para el desempeño profesional? *Revista Mexicana de Investigación Educativa*, *13*(38), 773-800.

(54) Schön, D. A. (1983). *The reflective practitioner: How professionals think in action*. Basic Books.

(55) Tenreiro, C. y Marques, R. (2006). Diseño y validación de actividades de laboratorio para promover el pensamiento crítico de los alumnos. *Revista Eureka Sobre Enseñanza y Divulgación de las Ciencias*, *3*(3), 452-466. https://www.redalyc.org/pdf/920/92030307.pdf

(56) Tobón, S. (2006). Aspectos básicos de la formación basada en competencias. *Proyecto Mesesup*. https://www.uv.mx/rmipe/files/2019/07/Aspectos-basicos-de-la-formacion-basada-en-competencias.pdf

(57) Tobón, S. (2007). El enfoque complejo de las competencias y el diseño curricular por ciclos propedéuticos. *Acción Pedagógica*, (16), 14-28.

(58) Torres, S. y Martínez, E. (2015). Laboratorio virtual de matemáticas como estrategia didáctica para fomentar el pensamiento lógico. *Revista Academia y Virtualidad*, *8*(2), 73–84. http://dialnet.unirioja.es/servlet/articulo?codigo=5236381&orden=0&info=link%5Cnhttp://dialnet.unirioja.es/servlet/extart?codigo=5236381

(59) Valero, G., Patiño, R. y Duque, O. (2013). Competencias para el programa de Contaduría Pública: una aproximación conceptual. *Contaduria Universidad de Antioquia*, (62), 11–36. https://doi.org/10.17533/udea.rc.18910

(60) Zuluaga, J. (2012, julio 24). Visita de funcionarios del Banco Mundial para actualizar el informe ROSC. *Actualícese.* https://actualicese.com/funcionarios-del-banco-mundial-visitaron-colombia-para-actualizar-el-informe-rosc/

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