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## Regulation and self-regulation of Learning: A Didactic Proposal in Secondary School

Regulação e autorregulação da aprendizagem: Uma proposta didática em

ANGELA ANDREA FERNÁNDEZ MONSALVE\*\*

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\*\* Student of the Doctoral Program in Education Sciences. Master in Didactics of Sciences. International Trade Professional. Academic coordinator of Rufino José Cuervo Centro School, Armenia, Quindío, Colombia, [angelandez@hotmail.com](mailto:angelandez@hotmail.com)



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UNIVERSIDAD  
La Gran Colombia

## ABSTRACT

This article collected the results of a research on regulation and self-regulation of learning in the study of sales tax. The learning achieved by eighth grade students during the development of a didactic proposal was analyzed. The methodology adopted involved: 1) the foundation around the concepts of regulation and self-regulation of learning and the strategies that favor its development; 2) the design and application of tools for data collection; and (3) analysis of selected cases. Three mechanisms were used for the interpretation: 1) establishment of emerging categories; 2) analysis of each of the instruments used (tests of previous ideas and learning assessment, didactic unit, regulation and self-regulation scripts, interview) and, 3) triangulation of the instruments analyzed. The analysis concludes: 1) Comprehension of the basic concepts of sales tax, identifying the elements that are part of the tax and formalizing accounting entries; 2) reorientation of the procedures, resources and evaluation used by the students and the teacher with the implementation of the didactic accounting unit; and 3) recognition of the processes of regulation and self-regulation of learning as an instrument of reflection and self-evaluation.

Keywords: Didactic proposal, Learning, Regulation, Self-regulation, Formative evaluation.

## RESUMO

Este artigo coletou os resultados da pesquisa: Regulação e autorregulação da aprendizagem no estudo do imposto sobre vendas, analisou-se qual a aprendizagem dos alunos da oitava série durante o desenvolvimento de uma proposta didática. A metodologia adotada envolveu: 1) o alicerce em torno dos conceitos de regulação e autorregulação da aprendizagem e das estratégias que favorecem seu desenvolvimento; 2) desenho e aplicação de instrumentos de coleta de dados; and (3) to analysis two selected cases. Para a interpretação, foram utilizados três mecanismos: 1) estabelecimento de categorias emergentes; 2) análise de cada um dos instrumentos utilizados (provas de ideias prévias e avaliação da aprendizagem, unidade didática, roteiros para regulação e autorregulação, entrevista) e, 3) triangulação dos instrumentos analisados. Da análise conclui-se: 1) Compreensão dos conceitos básicos do Imposto sobre Vendas, determinação dos elementos que integram o Imposto e formalização dos lançamentos contábeis; 2) reorientação dos procedimentos, recursos e avaliação utilizados pelos alunos e pelo professor com a implantação da unidade didática de contabilidade; e 3) reconhecimento dos processos de regulação e autorregulação da aprendizagem como instrumento de reflexão e autoavaliação.

Palavras-chave: proposta didática, aprendizagem, regulação, autorregulação, avaliação formativa.

## Introduction

Faced with a traditional teaching model where teachers demonstrate epistemological tendencies of a scientific and positivist nature, accompanied by cumulative conceptions of knowledge, students present difficulties in analyzing information, deepening or complementing their knowledge, reflecting and responding critically to the teacher's approaches. The pressing need arises to adopt a constructivist perspective that involves different strategies and teaching tools, learning and evaluation tools that allow to enhance the metacognitive capacity of the students. It is based on the assumption that if the student knows what, how and why he learns with a didactic strategy different from the one he knows, the modifications in his points of view on the relations between knowledge, teaching, learning and assessment are launched.

This research seeks to provide useful tools for understanding the learning generated during the development of a didactic proposal so that students learn to plan, anticipate, regulate and introduce changes that they consider necessary based on regulation and self-regulation in the study of sales tax.

The above has an impact on the participants' metacognitive reflections and, thus, on the intervention strategies, oriented to the recognition of previous ideas about the sales tax with the design and application of an objective test. Likewise, the enhancement and monitoring of the learning generated through the sequencing of activities with the didactic unit, the portfolio and an objective test. (Marchán & Sanmartí, 2015).

This research is in line with Colombian educational policies in the processes of improving student learning and evaluation and the transformation of teachers' pedagogical practices. In consideration of the above, this didactic proposal for teaching, learning and evaluation favors teacher reflection to objectively evidence student learning and build a culture of evaluation in the classroom that transcends the summative evaluation into a formative and formative one.

The advantages of formative evaluation and self-regulation in educational work promote meaningful student learning, favor an efficient classroom climate, provide feedback to the student and the teacher (Marchan & Sanmartí, 2015) enhance the metacognitive reflection of students and teachers, and develop their autonomy (Hinojosa & Sanmartí, 2016) encourages students a process of learning to learn. In the teacher, it teaches him to think under a dynamic and participatory classroom climate (Casado, 2018). In short, the value of research on teaching, learning and evaluation processes has been studied in Spain (Marchan & Sanmartí, 2015; Hinojosa & Sanmartí, 2016; Panadero & Alonso, 2014; Baker and Järvelä, 2015; Järvelä, 2015; Fernandez, 2017; Trias, 2017; Barrientos, 2019). Also, in Latin America (Valenzuela, 2018; Zambrano, Albarrán & Salcedo, 2018; Niño, Castellanos & Viloria, 2019; Becerra, Fernández & Pérez, 2018) and to a lesser extent in Colombia (Reinel, Álvarez & Velásquez, 2018; Hederich, Camargo & López, 2015; Pérez, et al., 2015; Arrieta, S. & Coronado E., 2014). These aspects underpin the academic, school and social relevance of this research proposal.

## Theoretical Perspective

The definition and origins of the formative evaluation, in the educational field, has become a concrete activity, therefore, the training evaluation has been considered as a "learning engine", whose purpose is regular (Sanmartí, 2007) cited by Yepes (2016).

The teacher as a "trainer" in the teaching-learning process, uses all possible strategies so that his practice is effective and develops according to the strengths and weaknesses of the students. That is why this stage of the evaluation is called "trainer", both for the student and for the teacher, and its essence is the regulation (to the student) (Fernandez, 2017).

"Formative Evaluation" has its origin in the one proposed by Scriven in 1967, because it refers to the mechanisms used by the teacher in order to adapt to the needs and developments of his students (Anduaga, 2016). Researchers such as Bonniol & Nunziati worked on how this type of assessment influenced students to overcome difficulties. Thus, the concept of formative

evaluation was enriched with new theoretical elements, among which the self-evaluation elements stand out (Fernández, 2017). From another constructivist perspective, the central idea of the formative evaluation is metacognition, for Botero, Alarcón, Palomino and Jiménez (2017) quoting Águila (2014) "it is the knowledge and regulation of our cognition and our mental processes, that is, a self-reflective knowledge" (p.91).

### Formative and Training Assessment

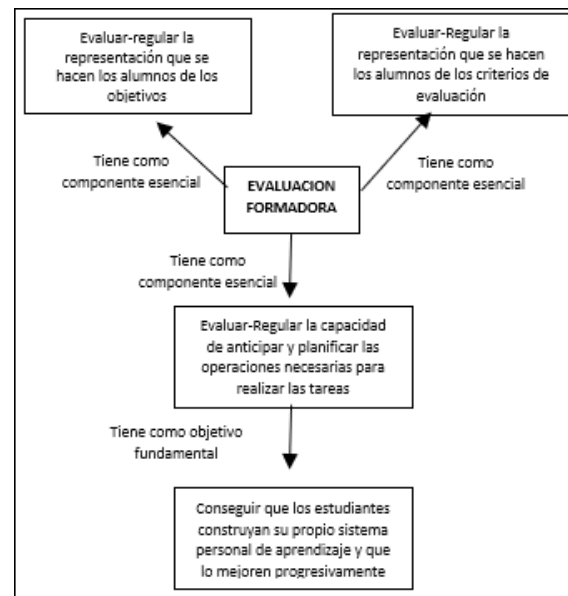
Metacognition, also called regulatory metacognition (Hinojosa & Sanmartí, 2016), is evident in students who are aware of the activities they develop and their products, who discuss their achievements or possible causes of their mistakes, in addition, make decisions to improve or change their products (Bautista, A. & Hernández, L., 2017). In this process, the consistency between what the student does and what the student proposes is evaluated, and then the teacher regulates what he finds inconsistent. This decision-making fulfills two functions, one of a social nature, that is, to select and classify students, called summative evaluation and, another of a pedagogical or formative nature, which consists of regulating the teaching-learning process so that it is meaningful, a key idea of the constructivist perspective (Zambrano, Albarrán & Salcedo, 2018).

The evaluation is divided into three moments of the teaching-learning process. First the initial call or diagnosis, whose objective is to analyze the situation of each student before starting the process, so that both the teacher and the student adapt this process to the needs encountered. Then, the so-called formative / training, which occurs throughout the process and are interrelated, but when the responsibility of regulating is the teacher is known as formative evaluation and when it is the responsibility of the student it is called training evaluation (Pérez, Enrique, Carbó & González, 2017). At the end of the teaching-learning process, the evaluation is called summative or qualifying, it aims to inform the interested parties about the results obtained (Jaramillo & Simbaña, 2014).

Among the different didactic proposals conceived during the educational history, the so-called "formative evaluation" is fundamental. Its objective is to ensure that each student learns to evaluate their own learning system, identifying their own

errors, analyzing them and making the necessary decisions to know how to regulate them and what it requires to carry them out (Figure 1).

Figure 1. Elements of formative evaluation



Source: Jorba and Sanmartí (1997).

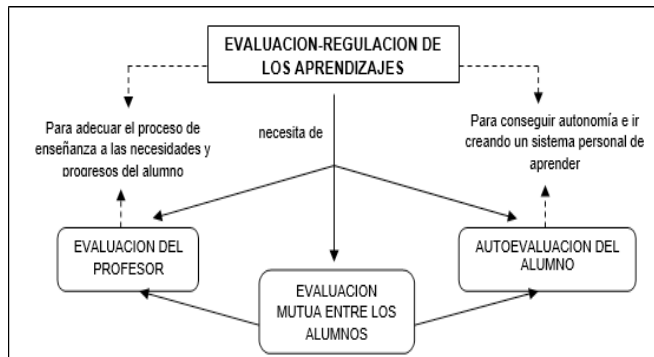
### The Evaluation-Regulation of Learning

Teaching and learning is a process of continuous regulation of learning, with regulation understood as "the adequacy of the procedures used by the teacher to the needs and difficulties that the student encounters in his or her learning process (and that are detected when assessing)" and continuous as "one of the permanent components" of pedagogical action (Koivuniemi, Panadero, Malmberg & Järvelä, 2017). Thus, learning implies identifying obstacles and regulating them, which is equal to evaluating, but without evaluating-regulating the congruence between actions and ideas. It does not constitute the progress in the learning of the students, nor effectiveness in the teaching work (Hinojosa & Sanmartí, 2016).

This process of continuous regulation of learning is characterized by three types of evaluation: First, the one performed by the teacher who detects and regulates what the student is not able to regulate by himself; second, the self-regulation made by the student of his learning process, and third, the co-evaluation or mutual regulation, developed by the interaction between the students themselves (Mas & Sanmartí, 2017).

Consequently, these types of evaluation are not independent, on the contrary, they are related (Figure 2.).

Figure 2. Continuous Evaluation-regulation Scheme



Source: Sanmartí, 2002

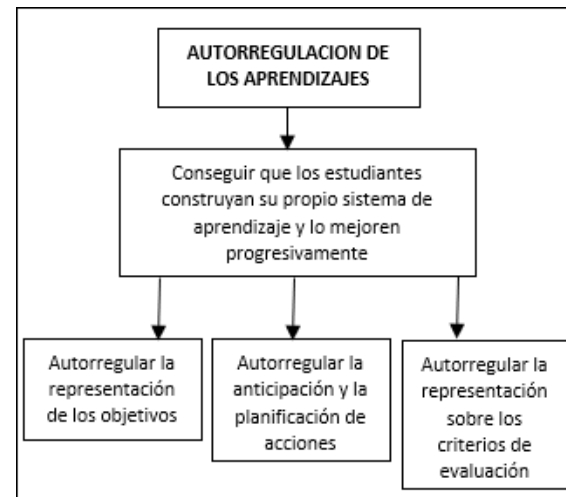
### Self-evaluation and Self-regulation

One of the main purposes of the formative evaluation is self-evaluation, because when a student is able to evaluate himself, his own activities, he knows how to recognize his successes or difficulties and can correct them, in other words, he self-regulates (Järvelä, 2015).

For a student to reach this point, the teacher must initiate a process of regulation, considering previously negotiated criteria and common objectives to be achieved, which allows the teacher to dedicate himself to addressing the specific difficulties when interacting with the students, that is, co-evaluation, until the student manages to self-evaluate (Casado, 2018).

The process of self-regulation of learning aims to get students to build their own learning system and improve it progressively, so that from this they self-regulate the representation of the objectives, the evaluation criteria and can anticipate and plan their actions in order to obtain better results (Figure 3).

Figure 3. Components of self-regulation of learning



Source: Sanmartí, 2002

### Co-evaluation and co-regulation

According to Hinojosa and Sanmartí (2016), formative assessment plays an essential role in teaching-learning activities, demonstrating how the characteristics of teaching-learning activities change with this new vision of assessment. Some of them can be presented within a working group, with which it is intended that students share their ideas and contrast them with those of their peers, this process is known as "mutual evaluation", since the members of the group enter into a dynamic of arguing for or against an idea or asking for clarifications, so that a climate of criticism is created that favors the learning of all in the classroom (Trías, D., 2017).

Mutual evaluation differs from co-evaluation (activity in which the evaluation is made between the teacher and the student) because group mates, such as students, do not have sufficient knowledge of the content and this hinders the making of appropriate decisions regarding the activity being evaluated, so it is of utmost importance to alternate mutual evaluation, with co-evaluation.

Therefore, the objective of co-regulation and co-evaluation is to ensure that each student is able to "self-regulate autonomously", that is, to facilitate self-evaluation (Hinojosa & Sanmartí, 2016).

## Evaluation Instruments

From the late 80s to the mid-90s, Jorba & Sanmartí developed a project whose purpose is that teachers in their teaching practices use a pedagogical component that incorporates the continuous regulation of learning. These authors are based on the works on evaluation and self-evaluation (Allal, 1988, 1991; Nunziati, 1990). In the same way they consider the contributions of the Theory of Activity (Talizina, 1988; Leontiev, 1989), to understand how students can learn (Nunziati, 1990) and with this theoretical foundation, propose the structuring of didactic sequences that constitute learning cycles, with activities aimed at regulating the representation of learning objectives, the abilities to anticipate and plan action to be able to apply new knowledge and, the self-management of difficulties, from the appropriation of the evaluation criteria (Casado, 2018).

In short, an evaluation instrument is also an instrument for learning, because it is used both to identify what is known, and to reflect on the knowledge obtained and decide on changing or modifying what is necessary. Therefore, the instruments are means to evaluate and from a formative constructivist perspective, to learn (Jaramillo & Simbaña, 2014).

## Didactic Unit

Different types of activities that have very specific purposes can be identified, these activities are organized and structured by "didactic sequences" that constitute the learning cycles and activities aimed at regulating the representation of the objectives of learning, the abilities to anticipate and plan the action to be able to apply the new knowledge and the self-regulation of the difficulties from the appropriation of the evaluation criteria.

Jorba & Sanmartí (1997) cited by Yepes (2016) propose 4 types of didactic activities: exploration, introduction of new knowledge, structuring or synthesis and application.

## Didactic Portfolio

The difference between the portfolio and other evaluation instruments is that it promotes the student to expose his self-reflection on the works he has developed (self-regulation), analyze and compare them with other students (co-regulation) and produce changes in the learning process throughout the topic or course, fundamental approach of the constructivist vision on evaluation trainer (Becerra, Fernández & Pérez, 2018). The content, according to Rey (2015), can be a deliberate and selected selection of a student's works (individual or group) that gives an account of their efforts, achievements, progress and ideas, accompanied by a critical personal reflection, among other instruments that explain their perception of the evaluation criteria", that is, everything that can be part of the work done to evidence their learning.

This raises the need to redesign and/or resize the evaluation processes in search of educational quality, necessary to respond to the challenges that the contemporary world presents to education.

## Objective Evidence

Multiple choice or objective tests are composed of a set of clear and precise questions that require a short answer on the part of the student, generally limited to the choice of an option already provided. The term objective refers to the conditions of application of the test, as well as, to the treatment and subsequent analysis of the results; however, this does not imply greater objectivity in the evaluation of the student's performance. Some aspects to consider in the elaboration of an objective test are: The selection of the contents, the writing of the questions or items, the correction and punctuation and the presentation of the same. (Ruiz, Rodríguez, Gallegos & Villacis, 2018).

## Materials and Methods

This research was proposed in the qualitative approach, as proposed by Rendón & Angulo (2017) from the critical social, constructivist and dialogical paradigm, which requires a cognizant subject and, from "the construction of knowledge", this paradigm considers it of shared creation from the

interaction between the researched and the researcher. The latter, is the one who carries out the emerging design of the research and the structure from the findings, that is, on the fly, the processes of observation, reflection, dialogue, construction of shared meaning and systematization are concretized.

The type of research was descriptive since the productions and conceptions of the students when they carry out didactic sequencing activities mediated by the regulation and self-regulation of learning were described.

As the main technique, the case study supported from the visions of Simons (2011), Rendon & Angulo (2017).

The validation of the instruments was carried out through methodological triangulation, which offers a greater feasibility to combine them, a characteristic for which it is considered one of the most used strategies or types of triangulation, since one of the greatest advantages of case studies is that within them different methods can be used to triangulate the findings obtained (Rendon & Angulo, 2017).

The selected population was 31 students of eighth grade of the subject of general accounting of the Technical Institute Olga Santamaría of the Municipality of Anolaima, Cundinamarca. This grade was chosen because, according to the school's curriculum, this grade is the beginning of the study of sales tax, oriented towards its understanding and application in everyday situations.

Of the 31 students selected for the classroom intervention phase, 3 students were chosen as the main case studies and 2 as complementary cases to carry out the results analysis phase.

This research based on the methodological strategy of case studies was developed in three phases, the first called *Foundation*, where the theoretical principles on which the research is based were outlined.

The second phase, called *Design and Application*, where the respective designs of information collection instruments were made, as well as the portfolio and the didactic unit to be applied. In the third phase, called *Analysis*, the appropriate selection of the cases was made, in addition to the analysis of the learning generated.

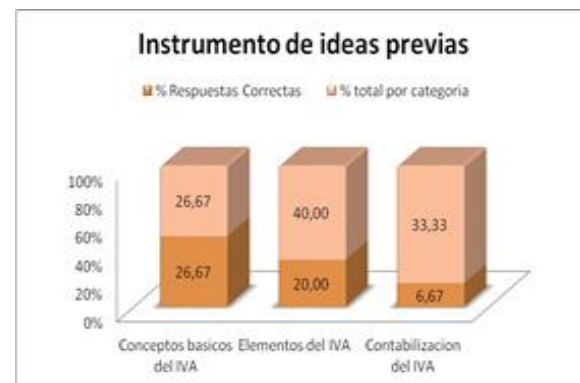
## Results

### Category 1. Conceptualization of Sales Tax

#### Analysis of the instruments of previous ideas and assessment of learning

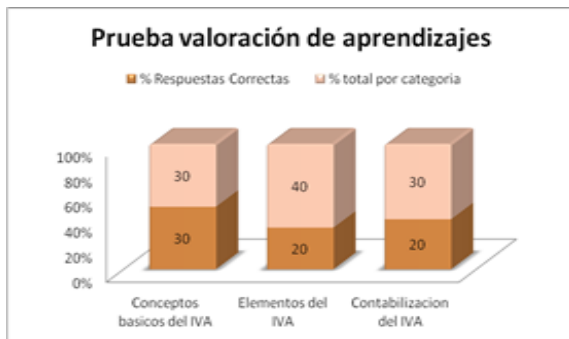
Student 1 (S1) in the instrument of previous ideas, with respect to the three subcategories (basic concepts, elements and accounting of sales tax) presents an average level of prior knowledge, since of fifteen questions S1 correctly answered eight that represents 53.34%, of which, four (26.67%) correspond to the first subcategory, three (20%) to the second and one (6.67%) to the third. This indicates that the S1 has moderately internalized the basic concepts of the tax, so it is difficult to understand the accounting process.

Graph 1. Results of the S1 in the instrument of previous ideas



In the learning assessment instrument, after the didactic intervention, S1 correctly answered seven out of ten questions, which correspond to 70% of the test, of which three (30%) correspond to the first subcategory, two (20%) to the second subcategory and two (20%) to the third subcategory.

Graph 2. Results of S1 in the learning assessment instrument



When comparing the results obtained in the first test with those obtained in the second test, after the intervention phase with the didactic unit, it could be seen that S1 effectively understood the basic concepts and the relationship of the elements involved in the sales tax, achieving its application in the accounting process. Like S1, 54% of the students presented an average level of prior knowledge in the subcategory of basic concepts and, after the didactic intervention, 57% of them internalized them, according to the general results of the learning assessment test.

For the second subcategory, elements involved in the sales tax, it went from a low previous knowledge of 33.3% to 54% in the learning assessment test, presenting a notable improvement in learning. And, in the third subcategory, accounting for sales tax, from a very low prior knowledge of 27.7% it went to 55%.

When comparing the instruments of previous ideas and assessment of learning, it was determined that the students acquired new knowledge after the application of the didactic unit. Remarkable advances were presented in the second and especially in the third subcategory, whose previous knowledge was quite deficient.

## Category 2. Regulation and Self-regulation of Learning:

Analysis of the results of the application of regulatory and self-regulatory documents

The *Didactic Contract* is the first regulatory activity that was carried out at the beginning of the didactic unit, in which students were asked to

write in their portfolio a proposal on the norms and rules to be met in the development of the didactic unit, some criteria that were presented to them were taken into account; then, they had to discuss with a group of classmates the proposals of each one and agree on ten rules to be exposed to the class, to finally be able to agree on the ten rules of the class and include them in their portfolio. Like S1 and S2, most of the students proposed that the activities be developed through cooperative work and that the students they easily understood be assigned as tutors for those who had difficulties, which allowed from the beginning of the intervention that the process of regulating learning was carried out.

As for the *Self-Regulation Script* that was proposed to be developed by each student at the end of each of the 9 activities proposed in the Didactic Unit, the objective was to get the student to reflect on what was done in class, answering the following questions: what did we do?, what did I know before starting the activity?, What did I learn, how did I learn it? And what am I not quite sure about? This allowed S1, as well as the other students, to reflect on the activities they carried out, as well as the results they obtained. This allowed the construction of knowledge from the interaction with other people (classmates and teacher), evaluated their learning, that of their peers and worked cooperatively.

Figure 3. Student S1's responses in the script of self-regulation

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Luego de cada una de las actividades, reflexione sobre lo hecho en clase y responda a estos interrogantes, en el portafolio de contabilidad así:

*Guion de Autorregulación*

*Actividad:* Videos (impuesto a las ventas IVA) No. 3

*¿Qué hicimos?*  
Vimos unos videos sobre el Impuesto a las ventas IVA, sacamos un resumen, hicimos el mapa conceptual y nos reunimos en grupo e hicimos un dramatizado representando una lectura sobre el IVA.

*¿Qué sabía antes de iniciar la actividad?*  
Qué son impuestos y qué es IVA, a quién se paga, ¿por qué? Y ¿para qué?

*¿Qué aprendí?*  
En que oportunidades hay que pagar IVA y en cuáles no.

*¿Cómo lo aprendí?*  
Realizando la dramatización y comprendiendo la lectura.

*¿De qué no estoy muy seguro?*  
Todo me quedó claro.

*Nota: Puede adicionar otro criterio si lo considera pertinente.*



The *Regulation Script* that was designed to be elaborated by the students in some activities (4, 6 and 9) proposed in the Didactic Unit, aimed to get the student to reflect on the approaches. And what am I not quite sure about? at the end of each activity.

Graph 4. Student S1 responses in the regulation script

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**ACTIVIDAD No. 6**

a) Escriba un cuento (mínimo 2 páginas) o dibuje una historieta (mínimo 8 escenas) teniendo en cuenta las siguientes palabras:

IVA	EXENTOS	IMPUESTO	SERVICIOS
TARIFA	PRODUCTOS	EXCLUIDOS	
VENTA	GRAVADOS	IMPORTACION	DIAN

b) En su grupo de trabajo, socialicen sus cuentos e historietas, indaguen y analicen los significados que les dieron sus compañeros a cada una de las palabras dadas inicialmente y escojan el cuento o historieta que consideren este más próximo a los significados de los términos dados, para luego ser expuesto al resto de la clase, utilizando el siguiente guion de regulación.

Guion de Regulación
Autoevaluación: <ul style="list-style-type: none"> <li>• ¿Qué hice? Una historieta hablando sobre el IVA y explicándole a un señor por qué hay que pagarle al estado impuestos por tener una empresa.</li> <li>• ¿Qué me hizo falta? La explicación de qué son bienes excluidos.</li> </ul>
Evaluación de los compañeros del grupo: Lorena: Mi compañera realizó bien el trabajo, hizo todos los puntos correspondientes. Natalia: Heidi acato las instrucciones correspondientes y está bien.
Revisión de la profesora: Hay algunos errores conceptuales, pero la historieta esta bien diseñada y es coherente en sus diálogos.

Preparado por: Angela Fernandez Monsalve  
Docente Contabilidad

This process allowed most of the students to recognize the purpose or objective of the activities they were proposed to perform, identify their mistakes or difficulties and those of their peers, and manifest it along with the reasons for it, as well as express their results and the possible causes of their mistakes so that they could improve them.

### Analysis of the results of the semi-structured interview with the selected case studies

In accordance with the criteria established for the analysis of the interview applied to the case studies, regarding the *conception of the student towards the evaluation regulation of the didactic process*, the students expressed their participation in the evaluation regulation of the didactic process for different reasons, among which stand out: the elaboration of the regulation script, the contributions and suggestions made in the presentations and debates, written and oral evidence of their difficulties and successes in learning the Sales Tax, their willingness to exchange activities, portfolios, opinions and explanations among peers, allowing them to evaluate and evaluate their peers on what they have learned, generating in the students a positive conception towards the regulatory evaluation of accounting didactics.

## Graph 5. S3 student responses in the semi-structured interview

### ENTREVISTA SEMI-ESTRUCTURADA DE LOS ALUMNOS

La presente entrevista tiene por finalidad conocer su opinión sobre el proceso de regulación y autorregulación que se llevó a cabo durante el desarrollo del tema "Impuesto a las Ventas IVA" en la asignatura de Contabilidad General; información valiosa para la mejora continua de la didáctica contable.

Nombre: Heidy Moreno

1. En función de las estrategias de evaluación regulación aplicadas durante el desarrollo de los contenidos del Impuesto a las Ventas IVA, ¿le permitían expresar sus dificultades y aciertos sobre lo aprendido?, ¿podía evaluar su propio aprendizaje y el de sus compañeros? Describa de qué forma.

Si, después de cada tema hacíamos debates sobre lo aprendido y nuestros compañeros nos decían qué nos quedó bien, qué nos faltó y la profesora también nos preguntaba si habíamos entendido y los que no entendían la profesora les explicaba y también lo hacíamos de forma escrita con el guion de regulación.

Si, porque cuando yo realizaba una actividad estaba segura que me había quedado bien debido a mis conocimientos y si el de mis compañeros también porque intercambiábamos actividades y ellos evaluaban la mía y yo la de ellos, también porque cuando algún compañero me preguntaba sobre la actividad yo les decía si estaba bien o no y si no estaba bien les explicaba.

2. Al realizar cada una de las actividades planteadas sobre el Impuesto a las Ventas, ¿era consciente de lo que hacía, de sus resultados y de las posibles causas de sus errores?, ¿reconocía la finalidad u objetivo de las actividades?, ¿planificaba el trabajo que se le pedía? Describa de qué forma.

Si, siempre estuve consciente de lo que hice, pero cuando no estaba segura o no entendía algún ejercicio le pedía a un compañero y a la profesora que me explicaran, pero en la mayoría de ocasiones hacía los ejercicios y los rectificaba con un compañero o le preguntaba a la profesora que si me había quedado bien o que me faltaba.

Si, porque cuando íbamos a realizar una actividad la profesora antes nos hablaba acerca del tema, entonces yo me hacía a la idea y entendía el tema.

A veces, pero la mayoría de veces lo planeaba en mi mente y ahí si lo escribía.

3. Al finalizar las actividades propuestas ¿comparaba sus propias representaciones con la forma de hacer de otros compañeros y con las sugerencias de la profesora?, ¿identificaba sus errores o dificultades y las de sus compañeros, y lo manifestaba junto con las razones de ello? Describa de qué forma.

Si, siempre las comparaba mi actividad con las opiniones de mis compañeros y la explicación de la profesora y con el guion de regulación y el intercambio de actividades.

Si, porque después de cada actividad me daba cuenta si algo me había quedado mal y lo corregía y pues al igual también le corregía a mis compañeros si veía algún error.

4. La interacción con sus compañeros y profesora durante las actividades ¿le permitió construir conocimiento sobre el IVA?, ¿le ayudó a tomar decisiones para modificar y mejorar sus producciones o las situaciones que suscitaron el error? Describa de qué forma.

Si porque intercambiamos conocimientos y así aprendimos más.

Si porque cuando mis compañeros y la profesora me explicaban pues así yo mejoraba o corregía mis actividades.

Elaborada por: Angela Fernandez Monsalve, Docente Contabilidad

For the second criterion *self-concept of the student before the performance of the activities carried out*, the answers of the students showed that each of them has their own point of view against the activities they perform. They assured to be aware of what they did in each activity, of their results and of the possible causes of their errors. They said they had recognized the objective of the activities they developed and planned them before carrying them out, to compare their productions with the way of doing other classmates and with the suggestions of the teacher and to be able to identify their difficulties and those of their classmates to manifest them along with the reasons for their findings.

As for the criterion *construction of knowledge from the interaction with their classmates and teacher*, the students expressed through their answers that they could share opinions, suggestions, knowledge, explanations that "helped them to learn more", all this allowed them to decide whether to modify or improve their productions, also helped by the regulation script in which they manifested the situations that caused the error.

This led to think that "teamwork" prevails in most students as a characteristic element of the didactic process of regulation and self-regulation that allowed them to build knowledge about the Sales Tax, during the class sessions.

**Data triangulation results**

In the data collection process, a series of instruments were used that provided both quantitative and qualitative data, which were significant to achieve a scientific rigor within the research.

The great diversity of information provided by the students through the questionnaires of previous ideas and assessment of learning, the didactic portfolios and the semi-structured interview carried out by the researcher to the didactic process executed in the classroom and to the different manifestations of regulation, as well as self-regulation of learning, constituted a wide, complex and nourished data structure, which involved using appropriate techniques to evaluate the entire conceptual network generated and to guarantee a validation procedure of these results. The technique of Data Triangulation was carried out, so a matrix was designed for each of the two categories of analysis, in order to make the comparison of the results obtained in the different instruments applied during the research.

Graph 6. Methodological triangulation matrix used

<b>OBJECTIVE:</b> To analyze the learning generated in eighth grade students during the development of a constructivist strategy, within the framework of sales tax, based on regulation and self-regulation.			
<b>CATEGORY:</b> Conceptualization of VAT			
<b>METHODOLOGICAL TRIANGULATION</b>			
<b>INSTRUMENT OF PREVIOUS IDEAS</b>	<b>PORTFOLIO</b>	<b>OBSERVATIONS</b>	<b>LEARNING ASSESSMENT TEST</b>

<b>OBJECTIVE:</b> To analyze the learning generated in eighth grade students during the development of a constructivist strategy, within the framework of the sales tax, based on regulation and self-regulation.			
<b>CATEGORY:</b> Regulation and Self-regulation of Learning:			
<b>METHODOLOGICAL TRIANGULATION</b>			
<b>SELF-REGULATION SCRIPT</b>	<b>PORTFOLIO</b>	<b>OBSERVATIONS</b>	<b>INTERVIEW</b>

Most of the criteria to analyze category 1 Conceptualization of the Sales Tax, allowed to establish similarities that lead to confirm the coherence between the data collected in the four instruments applied during the research to describe the learning generated in the students before the didactic process carried out.

Coherence was evidenced between the results obtained in the observations of the class sessions, the interview, the self-regulation scripts and the portfolio, the cooperative work during the realization of the activities and the evaluation of the same, which reflected strengths for the criteria established towards the regulation of the didactic process, fulfilling the objective set at the beginning of the research (García, A., 2018).

**Discussion**

From the analysis before and after the didactic intervention, it remains as a reflection, that the learning of an accounting concept such as in this case the Sales Tax, becomes much more significant when didactic sequences related to the context of the student are planned in which both the student and the teacher can enhance the metacognitive reflection Chaparro, R., Flórez, C., Gordillo, D., Jaramillo, V. & Solarte, A. (2015). A study developed in Spain by Casado (2018) coincides with our observation, in which evaluation fulfills an essential function of regulation and concludes that the social interaction between students and their teacher enhances metacognitive reflection.

In relation to the reflection in which students were able to evaluate their own learning and that of their peers, the development of the didactic intervention coincides with the studies of the Spanish Barrientos (2019) and the Colombians Chitiva et al. (2017) in which it was determined that formative evaluation promotes student learning, as well as negotiation promotes self-regulation

and self-evaluation of students, throughout the didactic unit.

This study allowed most of the students to recognize the purpose or objective of the proposed activities, identify their errors or difficulties and those of their peers, and manifest it along with the reasons for it, as well as express their results and the possible causes of their errors so that they could improve them, coincides with what zamora (2015) proposed. Arrieta & Coronado (2014) in their studies applied in secondary school, determined that activities can be developed from the deficiencies found in the evaluation and turn them into processes of self-regulation and interregulation.

From the point of view of the didactics of accounting Anduaga (2016) cites Seltzer (2001), in his research article he proposes the application of a didactic based on activities and creative techniques, it is relevant if it is contextualized according to the needs of students so that they glimpse the practical sense of accounting (Barrios, 2018). These contributions were very useful in the construction of the didactic unit, because it was possible to observe a set of actions and a series of metacognitive questions in the language of the students, which ran through the logical process of their thinking in the solution of accounting probability situations.

## Conclusions

Learning about the Sales Tax integrates constructivist visions on metacognition reflection, formative evaluation, cooperative work, regulation and self-regulation of learning, Hinojosa & Sanmartí (2016), Casado (2018) Barrientos (2019).

It shows the understanding of the basic concepts of The Sales Tax, the socioeconomic importance, the differences between the existing sales regimes in the country, the concepts of natural and legal person, the classes of goods, the applicable rates, the subjects that intervene in the tax, the formalization of accounting entries, the principle of the double entry, through the analysis and resolution of probability situations for the accounting of sales tax.

The implementation of the didactic unit and the use of technological resources, during the

process of exploration, introduction, application and synthesis, encourage in students a progressive and gradual process in the construction of learning about the Sales Tax, which evolves from previous ideas to the more formal definitions of the content selected and developed in the proposal based on regulation and self-regulation.

The didactic proposal on the Sales Tax, indicates from the beginning of the research, the need to incorporate the theoretical foundations to continue reorienting the didactic process of accounting, this modifies the traditional classes based on texts and the teacher's speech.

As a result of the implementation, it is affirmed that it represents a guiding guide available to the teacher that facilitates the advice and mediation of the new accounting learning of the selected unit.

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