


Curricular importance of chemistry in higher education and the prioritized curriculum with emphasis on competencies at the baccalaureate level issued by the Ministry of Education of Ecuador

Importância curricular da química no ensino superior e o currículo priorizado com ênfase em habilidades no nível de bacharelado emitido pelo Ministério da Educação do Equador

Importancia curricular de la Química dentro de la educación superior y el currículo priorizado con énfasis en competencias a nivel de bachillerato emitido por el Ministerio de Educación del Ecuador

Dennis Renato Manzano Vela<https://orcid.org/0000-0002-7834-276X> 

Research Professor at the Faculty of Natural Resources of Escuela Superior Politécnica de Chimborazo, Ecuador

dennis.manzano@epoch.edu.ec (correspondence)**Sandra Paulina Cuichán Bravo**<https://orcid.org/0000-0002-9105-3356> 

Coordinator of the Master's Program in Pedagogy of experimental sciences with a mention in Chemistry and Biology.

Universidad Central del Ecuador.

spcuichanb@uce.edu.ec**ABSTRACT**

This research work analyzes the curricular importance of chemistry in higher education and how the prioritized curriculum of the Ecuadorian baccalaureate, with emphasis on competencies, influences the academic and professional training of students. Desirable and essential skills in chemistry and how they relate to the competencies needed for success in higher education and in the workplace are addressed. Through the review of official documents, previous research and academic publications, the objectives, structure and contents of the prioritized curriculum in Chemistry in the Ecuadorian baccalaureate are examined. In addition, it is discussed how the implementation of this competency-based approach can face challenges and generate academic problems in higher education, such as knowledge gaps, insufficient practical skills and difficulties in critical and analytical thinking. Finally, some strategies and recommendations are proposed to improve the teaching of chemistry in Ecuadorian high school and facilitate the transition to higher education, including the promotion of teacher training, investment in infrastructure and educational resources, and the promotion of collaboration between secondary and higher education institution.

Keywords: prioritized curriculum; Ecuadorian baccalaureate; higher education; chemistry; competencies; Ministry of Education of Ecuador.

RESUMO

Este trabalho de pesquisa analisa a importância curricular da Química no ensino superior e como o currículo priorizado do ensino médio equatoriano, com ênfase nas competências, influencia a formação acadêmica e profissional dos alunos. São abordadas as competências desejáveis e essenciais em Química e como estas se relacionam com as competências necessárias para o sucesso no ensino superior e no local de trabalho. Por meio da revisão de documentos oficiais, pesquisas anteriores e publicações acadêmicas, examinam-se os objetivos, a estrutura e os conteúdos do currículo priorizado em Química no ensino médio equatoriano. Além disso, discute-se como a implementação dessa abordagem de competência pode enfrentar desafios e gerar problemas acadêmicos no ensino superior, como lacunas no conhecimento, habilidades práticas insuficientes e dificuldades no pensamento crítico e analítico. Finalmente, propõem-se algumas estratégias e recomendações para melhorar o ensino de Química no ensino médio equatoriano e facilitar a transição para o ensino superior, incluindo a promoção da formação de professores, o investimento em infraestrutura e recursos educacionais e a promoção da colaboração. instituições de ensino superior.

Palabras clave: currículo priorizado; bacharelado equatoriano; educação superior; química; habilidades; Ministério da Educação do Equador.

RESUMEN

El presente trabajo de investigación analiza la importancia curricular de la Química en la educación superior y cómo el currículo priorizado del bachillerato equatoriano, con énfasis en competencias, influye en la formación académica y profesional de los estudiantes. Se abordan las destrezas deseables e imprescindibles en Química y cómo estas se relacionan con las competencias necesarias para el éxito en la educación superior y en el ámbito laboral. A través de la revisión de documentos oficiales, investigaciones previas y publicaciones académicas, se examinan los objetivos, estructura y contenidos del currículo priorizado en Química en el bachillerato equatoriano. Además, se discute cómo la implementación de este enfoque de competencias puede enfrentar desafíos y generar problemas académicos en la educación superior, como brechas en el conocimiento, habilidades prácticas insuficientes y dificultades en el pensamiento crítico y analítico. Finalmente, se proponen algunas estrategias y recomendaciones para mejorar la enseñanza de la Química en el bachillerato equatoriano y facilitar la transición a la educación superior, incluyendo la promoción de la formación docente, la inversión en infraestructura y recursos educativos, y el fomento de la colaboración entre instituciones de educación secundaria y superior.

Palabras-chave: currículo priorizado; bachillerato equatoriano; educación superior; Química; competencias; Ministerio de Educación del Ecuador.

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The article addresses in detail a subject that has been little explored in education studies regarding the Ecuadorian context.

INTRODUCTION

Chemistry is a fundamental science that studies the structure, properties and transformations of matter. This discipline is important in higher education as it provides a solid foundation for understanding other disciplines such as biology, physics, medicine, engineering and many others (Ramos et al., 2022).

In the context of higher education, chemistry is essential for the training of professionals in various areas, such as chemical engineering, pharmaceuticals, biotechnology, materials science, among others. In addition, chemistry is also important for science teacher education and for scientific research (Medina, 2021).

In the case of secondary education in Ecuador, the Ministry of Education has established a prioritized curriculum with an emphasis on competencies, which aims to develop abilities and skills in students. In this curriculum, chemistry is one of the learning areas and focuses on the development of life skills, such as problem solving, informed decision making and effective communication (Giler-Medina, 2023a).

Among the topics covered in the chemistry curriculum in Ecuador are the structure of matter, chemical reactions, stoichiometry, thermodynamics, chemical kinetics, electrochemistry, organic chemistry, and biochemistry. In addition, it seeks to promote the development of experimental skills through the performance of experiments and the interpretation of experimental data (Giler-Medina, 2023b).

In the area of chemistry, the prioritized curriculum seeks for students to develop skills such as the identification and explanation of chemical phenomena, the application of concepts and principles of chemistry to solve problems and the appreciation of the importance of chemistry in daily life and in sustainable development (Valdez et al., 2022).

However, the requirements of the educational system at a higher level maintain administrative and academic difficulties, linked to the graduation profile of the bachelors, additionally there is no regular admission and leveling system, thus the present research work proposes to analyze descriptively the curricular importance of Chemistry as a subject within higher education and the prioritized curriculum with emphasis on skills at the baccalaureate level issued by the Ministry of Education of Ecuador.

METHODOLOGY

In this descriptive study with a qualitative design, the study problem was defined by clearly identifying and delimiting the subject of study, in this case, the curricular importance of chemistry in higher education and high school in Ecuador, and how it is related to the competencies approach, the review of the scientific and academic literature related to the subject, included previous studies, theoretical frameworks, educational policies and good practices in the teaching of chemistry, data was collected that includes information on educational policies and practices in Ecuador, academic results, perceptions of students and teachers, and other factors that directly influence the curricular importance of chemistry and the competency approach; finally, the qualitative results were related to the curricular implications of chemistry and the competency approach in education. higher education and high school in Ecuador.

RESULTS AND DISCUSSION

The curriculum of the Ministry of Education of Ecuador

Pedagogy and curriculum are closely related in the field of education. Pedagogy refers to the art and science of teaching, that is, the methods and approaches used to facilitate student learning (Herrera Pavo & Cochancela Patiño, 2020). The curriculum, on the other hand, is a structured plan that contains the learning objectives, content, activities, resources, and assessment methods for a specific course or educational program. The curriculum in the context of pedagogy has several purposes:

- Provide structure: The curriculum offers a solid foundation and framework for educators to plan and deliver their lessons.
- Establish learning objectives: The curriculum establishes learning objectives and desired results for students, ensuring that all educators work towards common goals.
- Establish contents and activities: The curriculum includes the topics, concepts and skills that will be taught, as well as the activities and resources to facilitate student learning.

- Guide Assessment: The curriculum provides the guidelines and criteria for assessing student progress and performance, allowing educators to provide feedback and adapt their teaching as needed.

Pedagogy and curriculum work together in the educational process, with pedagogy guiding the way the curriculum is taught and student learning is facilitated.

In Ecuador, the curriculum of the Ministry of Education is an educational framework that establishes the contents, objectives and methodologies that must be followed in the country's educational institutions. This curriculum is developed according to the educational level and the needs and characteristics of the students.

The educational system in Ecuador is divided into different levels:

Initial Education: Focuses on the integral development of boys and girls from 0 to 5 years of age.

Basic General Education: It is divided into three sublevels: Elementary, Middle and Higher, and serves students from 5 to 14 years of age.

Baccalaureate: It takes place in three years and focuses on the academic and technical training of students between the ages of 15 and 17.

Higher Education: Includes technical and technological training, and university and postgraduate studies (Ministerio de Educación de Ecuador, 2020b).

The curriculum of the Ecuadorian Ministry of Education is based on a competency-based approach, which means that it focuses on the development of specific skills and abilities rather than just on the transmission of content. It also seeks to promote inclusive, equitable, and quality education for all students (Ministerio de Educación de Ecuador, 2020a).

The Ecuadorian Ministry of Education provides curricular documents and guides for each level and area of study, which include learning objectives, content, evaluation criteria, and methodological guidelines.

Teachers in Ecuador must follow the curricular guidelines established by the Ministry of Education and adapt them according to the needs of their students and the context of their educational institutions (Patricia et al., 2020).

The curriculum in higher education in Ecuador

The curriculum in higher education in Ecuador includes the set of objectives, contents, methodologies and evaluations that guide teaching and learning in institutions such as universities, technical and technological institutes and polytechnic schools. The purpose of this curriculum is to provide students with the necessary knowledge and skills for their personal and professional development, as well as to contribute to the socioeconomic progress of the country (Vera, 2022).

Higher education in Ecuador is regulated by the Higher Education Council (CES) and the Secretary of Higher Education, Science, Technology and Innovation (SENESCYT). These institutions establish the policies and guidelines that higher education institutions must follow. Some important characteristics of the curriculum in higher education in Ecuador include:

- Competence-based approach: The curriculum is based on the development of specific competences, which means that it focuses on the learning of practical skills and abilities, and not only on the acquisition of theoretical knowledge.
- Diversity of careers: Higher education in Ecuador offers a wide range of programs and careers in different areas of knowledge, including social sciences, natural sciences, engineering, arts, humanities, and more.
- Curricular flexibility: Higher education institutions have some autonomy to adapt and modify their curricula according to the needs and characteristics of their environment and academic community, as long as they follow the guidelines and policies established by the CES and SENESCYT.
- Research and innovation: The Ecuadorian higher education curriculum also promotes research and innovation as key elements in student training, fostering the creation of new knowledge and solutions to local and global problems.
- Links with society: Higher education in Ecuador seeks to promote links between academic institutions and society, with the aim of contributing to the sustainable development of the country and improving the quality of life of its population.

Each higher education institution in Ecuador has its own study plans and training programs, always following the guidelines and policies of CES and SENESCYT. This ensures that students receive a quality education relevant to their needs and to the national and international context (Andrade et al., s. f.).

Chemistry as a basic science in the curriculum

Chemistry focuses on the study of the structure, composition and properties of matter, as well as the transformations it undergoes. This discipline is essential to understand the natural processes and products used in everyday life (Franco Moreno et al., 2017). Additionally, chemistry is a key component in advancing areas such as biology, physics, medicine, agriculture, and engineering. Including chemistry in the curriculum is important for several reasons:

- **Scientific Knowledge:** Chemistry provides a solid foundation for understanding how natural processes and phenomena work at the molecular level. This knowledge is essential for understanding other sciences, such as biology, physics, and geology.
- **Developing Critical and Analytical Thinking:** Studying chemistry helps develop critical and analytical thinking skills, as students learn to formulate hypotheses, design experiments, analyze data, and draw conclusions based on evidence.
- **Innovation and technology:** Chemistry is key in the development of new technologies and materials in fields such as medicine, energy, agriculture and industry. A curriculum that includes chemistry encourages innovation and creativity in students, preparing them to face the challenges of the future.
- **Environmental Awareness:** Chemistry is critical to understanding and addressing environmental issues such as pollution, climate change, and natural resource management. By studying chemistry, students gain a greater awareness of their environment and the importance of acting sustainably and responsibly.
- **Preparation for Careers and Higher Education:** Chemistry is a basic requirement for many careers and higher education programs in the natural sciences, engineering, and medicine. Including chemistry in the curriculum ensures that students are prepared to continue their studies and careers in these areas.
- **Scientific Literacy:** Studying chemistry helps students develop the ability to make informed decisions and participate actively and responsibly in scientific and technological issues that affect society. Scientific literacy is essential to form informed and engaged citizens.

The inclusion of chemistry in the curriculum is essential to provide students with a comprehensive and balanced education, develop essential skills and prepare them to face the challenges of the future in an increasingly globalized and knowledge-based society (Pérgola & Galagovsky, 2020). Thus, the curricular importance of chemistry in higher education stands out:

- **Development of scientific and analytical skills:** Chemistry helps develop skills such as critical thinking, problem solving, analytical skills and evidence-based decision making.
- **Understanding of interdisciplinary concepts:** Chemistry is related to other sciences and areas of study, allowing students to develop a solid foundation of knowledge and skills applicable to various disciplines.
- **Promotion of innovation and technological development:** Chemistry plays a fundamental role in the research and development of new technologies, clean energy, medicines and materials, which contributes to the economic and social progress of the country.
- **Environmental Awareness:** Chemistry enables students to understand the impact of human actions on the environment and promotes sustainable solutions to address ecological and climate challenges (Barraqué et al., 2021).

Prioritized curriculum with emphasis on skills at the baccalaureate level

The competency approach in education has gained importance in recent decades, as it focuses on the comprehensive development of skills and abilities that allow students to apply their knowledge in real contexts and face challenges in their personal and professional lives. This approach seeks that students acquire knowledge and skills that are useful beyond the classroom, and that they are prepared to face real life situations (Ministerio de Educación de Ecuador, 2020).

A prioritized curriculum with an emphasis on skills at the baccalaureate level seeks to develop specific skills in various areas of knowledge, such as chemistry, mathematics, biology, physics, language, and social sciences, among others. This approach involves the integration of cognitive, social-emotional, and practical skills. Some of the key competencies in this approach include:

- **Cognitive skills:** They refer to the development of intellectual skills, such as critical thinking, problem solving, analytical skills and creativity. These skills allow students to learn effectively and apply their knowledge in real situations.
- **Socio-emotional competencies:** These skills are related to the emotional and social development of students, such

as empathy, self-esteem, effective communication, collaboration, and teamwork. These skills are essential for success in the workplace and in interpersonal relationships.

- **Practical competences:** These are those skills that allow students to carry out specific tasks effectively, such as carrying out experiments in a laboratory, writing technical reports, handling tools or using digital technologies.

The design and implementation of a prioritized curriculum with an emphasis on competencies at the high school level requires collaboration between teachers, educational institutions, and government authorities. In addition, it is essential to have adequate evaluation methods to measure the progress of students in the development of these competencies and adjust the curriculum based on the results obtained (Venegas Traverso, 2021).

The Ecuadorian Ministry of Education has designed a curriculum that emphasizes the development of competencies in teaching chemistry at the high school level (Ministerio de Educación de Ecuador, 2020). These competencies include:

- **Understand and apply fundamental concepts of chemistry:** Students must acquire a solid understanding of the structure of matter, chemical reactions, chemical equilibrium, and kinetics, among other topics.

- **Develop Laboratory and Experimental Skills:** Students must learn to conduct experiments, manipulate instruments, interpret data, and follow safety protocols in the laboratory.

- **Critical Thinking and Problem Solving:** Students must be able to analyze and solve chemical problems through the use of theoretical concepts and principles.

- **Scientific communication:** Students must be able to communicate their ideas, arguments and results clearly and effectively, both orally and in writing.

- **Teamwork:** Students must learn to collaborate and work as a team to carry out investigations and scientific projects.

Prioritized curriculum analysis with emphasis on competencies in the subject of Chemistry

The coding of competencies and skills of the prioritized curriculum in the Ecuadorian baccalaureate in Chemistry can be organized as follows:

Chemistry (Q)

Q1. Knowledge of the theoretical and conceptual foundations of Chemistry

Q2. Application of laws, principles and chemical models

Q3. Skills in conducting experiments and using laboratory instruments

Q4. Analysis and interpretation of experimental data

Q5. Development of investigative and problem-solving skills in Chemistry

Q6. Understanding the relationship between Chemistry and its impact on society and the environment

Q7. Promotion of safety and responsibility in the handling of chemical substances and processes

These competencies and skills are intended to provide students with a solid foundation in the fundamental concepts of Chemistry, as well as practical and analytical skills necessary to address problems and situations related to this discipline (Giler-Medina, 2023a). In addition, they focus on the development of critical thinking and the scientific approach in problem solving and research. It is important to mention that this coding is not official and may vary depending on the institutions and study programs. However, it serves as a general framework to understand the competencies and skills that are intended to be developed in the teaching of Chemistry in the Ecuadorian high school.

Additionally, there are some desirable and essential skills that students must acquire in Chemistry to obtain a solid foundation in this discipline. These skills can be classified into theoretical knowledge, practical skills, and analytical skills (Bernal et al., 2018).

Essential skills:

- **Knowledge of fundamental concepts and principles in Chemistry,** such as atomic structure, chemical bonding, nomenclature, stoichiometry and chemical reactions.

- Understanding and application of chemical laws and principles, such as the law of conservation of mass, the ideal gas law and the laws of thermodynamics.
- Ability to carry out experiments and correctly use laboratory instruments and techniques, such as titration, chromatography and spectroscopy.
- Analysis and interpretation of experimental data, including the preparation of graphs, calculations and evaluation of results.
- Development of research skills and problem solving in chemical contexts.

Desirable Skills:

- Understanding of the relationship between Chemistry and other scientific disciplines, such as Physics and Biology.
- Knowledge of Chemistry in everyday applications and its impact on society and the environment.
- Promotion of safety and responsibility in the handling of chemical substances and chemical processes .
- Ability to effectively communicate the results of chemical experiments and projects, both orally and in writing.
- Ability to work in a team and collaborate on research or experimental projects.
- Development of critical thinking and decision-making skills in situations related to Chemistry.

These essential and desirable skills provide students with a comprehensive training in Chemistry that will allow them to apply their knowledge and skills in future university studies or in the workplace. In addition, they encourage the development of critical thinking and analytical skills that are essential in any area of study or work (Medina, 2021).

Prioritized curriculum analysis with emphasis on competencies and higher education requirements

The prioritized curriculum with emphasis on competencies at the baccalaureate level of the Ministry of Education of Ecuador seeks to focus on the development of essential skills and competencies for students (Giler-Medina, 2023b). Despite its objectives, there are some shortcomings and areas for improvement in this approach:

- Disarticulation with higher education: The lack of connection between the competency approach in secondary education and higher education programs creates difficulties in the transition of students to university education.
- Outdated content: The curriculum is not up to date with scientific, technological and socioeconomic advances due to the lack of updating and revision of the didactic material, which affects the preparation of students to face the challenges in higher education and the labor market.
- Insufficient development of practical skills: Although the approach is based on competencies, the curriculum does not provide enough opportunities for students to develop practical and experiential skills, especially in areas such as science and technology, which is evidenced by the need for a leveling system within of the higher education system.
- Broad and superficial approach: The prioritized curriculum covers many areas of knowledge and skills, which leads to a superficial coverage of topics and makes it difficult to develop deeper and specialized skills in specific areas as there are no scientific specialties and only one specialty system. technical.
- Inadequate assessment: There is a lack of appropriate assessment methods to measure the competencies and skills of students instead of focusing only on memorization and theoretical knowledge, on the other hand, despite the codification of the competencies and skills to be developed on evaluation system is guaranteed for the approval of the baccalaureate levels.
- Insufficient resources and teacher training: The lack of adequate resources and laboratories, as well as the insufficient training and updating of teachers, limits the quality of teaching and the learning of skills.
- Inequalities in education: The implementation of the prioritized curriculum is affected by regional and socioeconomic inequalities in the quality of education, which generates gaps in the development of skills among students, especially the gap between public and private education. linked to the fulfillment of desirable and essential skills.

Proposal for improvement in the critical points of the prioritized curriculum with emphasis on competencies

With these dimensions presented in the previous section, it is proposed that to address these deficiencies, the Ministry of Education of Ecuador may consider the following actions:

- Improve the articulation between secondary education and higher education, facilitating the transition of students.
- Review and update the curriculum to reflect current scientific, technological, and socioeconomic advances.
- Strengthen the focus on the development of practical and experiential skills in key areas such as science and technology.
- Review the focus and scope of the curriculum to ensure an appropriate balance between coverage of topics and the development of specialized skills.
- Design assessment methods that measure students' competencies and abilities effectively.
- Invest in the training and updating of teachers and in the improvement of teaching resources and laboratories.
- Address inequalities in education through policies and programs that ensure access to and quality of education for all students, regardless of their location or socioeconomic status (Valdez et al., 2022)

Prioritized curriculum analysis with emphasis on competencies and higher education requirements in the subject of Chemistry

The curricular problem of Chemistry as a subject within higher education in Ecuador and the prioritized curriculum with emphasis on skills at the baccalaureate level is due to several factors (Larrea de Granados, 2014). Of which stand out:

- Disarticulation between secondary and higher education: The lack of coherence and articulation between the competency approach in secondary education and higher education programs in chemistry results in transition difficulties for students.
- Outdated content: There is a gap between the content taught in secondary education and scientific and technological advances in the field of chemistry. This affects the preparation of students to face the challenges in higher education and the world of work.
- Insufficient emphasis on practical skills: The curriculum focuses on theory and does not provide enough opportunities for students to develop practical and experimental skills, which are essential for learning chemistry.
- Inadequate assessment: The lack of appropriate assessment methods to measure chemistry competencies, instead of focusing only on memorization and theoretical knowledge, can affect the quality and effectiveness of teaching.
- Lack of resources and teacher training: The lack of resources and adequate laboratories, as well as the lack of training and updating of teachers, can limit the quality of teaching and learning of chemistry in secondary and higher education (Herrera Pavo & Cochancela Patiño, 2020).

Graduation profile analysis of the Ecuadorian bachelor

The graduation profile of an Ecuadorian bachelor refers to the set of knowledge, skills, attitudes and values that a student must have acquired upon completing their baccalaureate studies in Ecuador (Ministerio de Educación de Ecuador, 2020a). The graduation profile is based on the national curricular framework established by the Ecuadorian Ministry of Education and may vary slightly depending on the educational institutions and the different types of baccalaureate that exist in the country. In general, an Ecuadorian bachelor must comply with the following aspects:

- Knowledge: The student must possess a solid set of knowledge in basic areas such as mathematics, natural sciences, social sciences, language and literature, as well as in specific areas of their specialization.
- Cognitive skills: The Ecuadorian bachelor must be able to analyze, synthesize, evaluate and apply information, as well as formulate questions and solve problems. In addition, you must demonstrate critical thinking, creativity, and decision-making skills.
- Communication skills: You must be able to express yourself clearly, coherently and precisely both orally and in writing, and understand and analyze various types of texts. Also, you must have communication skills in at least one foreign language.
- Social and emotional skills: The graduate must know how to work in a team, resolve conflicts, show empathy and respect for cultural differences and opinions. In addition, they must be able to make ethical decisions and act responsibly and

with commitment.

- Values and citizenship: The Ecuadorian bachelor must be committed to the exercise of their rights and duties as a citizen, as well as to the promotion and defense of human rights, gender equality and respect for the environment.
- Autonomy and self-learning: Graduates must be able to plan and regulate their own learning, setting goals and developing strategies to achieve them. In addition, you must be able to adapt to different contexts and situations.
- Orientation towards work and productivity: The Ecuadorian bachelor must be prepared to enter the world of work, either through higher education or direct employment. You must have a proactive, committed and responsible attitude towards work and the development of your skills and abilities.

It is worth mentioning that each educational institution can complement this graduation profile with additional aspects according to their own needs and pedagogical approaches (Vera, 2022).

Methodologies for addressing the prioritized curriculum with emphasis on competencies

Within the teaching-learning process, flaws have been detected between the curricular level in the subject of chemistry within higher education and the prioritized curriculum with emphasis on skills at the baccalaureate level, therefore in this paradigm some key methodologies and pedagogical strategies are proposed . in the teaching of chemistry in higher education and high school in Ecuador which include:

- Problem-Based Learning (PBL): This methodology involves presenting students with real and relevant problems in the field of chemistry, which allows them to develop critical thinking, problem-solving, and teamwork skills.
- Cooperative Learning: Foster teamwork and collaboration among students through group activities, projects, and class discussions. This approach helps develop social and communication skills, as well as encourage peer learning.
- Experimental Approach: Chemistry is an experimental science by nature. Carrying out experiments and laboratory practices allow students to apply and contextualize theoretical concepts learned in class, develop technical skills, and learn to work safely in a laboratory environment.
- Use of information and communication technologies (ICT): The integration of ICT in the teaching of chemistry, such as the use of simulation software, online platforms and multimedia resources, can enrich the learning process and help students to understand abstract and complex concepts more effectively (Andrés et al., 2022).
- Formative and Competency Assessment: Use a variety of assessment methods that allow students to demonstrate their chemistry competencies, such as written exams, lab reports, presentations, and projects. Formative assessment provides continuous feedback to students, allowing them to improve and adjust their learning throughout the process (Taborda et al., 2022).

These pedagogical methodologies and strategies, when applied effectively, can significantly improve the quality of chemistry teaching in higher education and baccalaureate in Ecuador. Additionally, aligning the curriculum with a competency-based approach ensures that students are well-prepared for future academic and career challenges (Barzallo Padilla, 2023; Moreno, 2022).

The geographic and cultural diversity in Ecuador poses challenges when designing and implementing a prioritized curriculum that adapts to the needs and characteristics of all regions and communities. Differences in cultural context and geographic conditions may require specific adaptations of the curriculum to ensure its relevance and accessibility in each area. In addition, it is important that education professionals are sensitive to cultural variations and can transmit knowledge effectively in different contexts.

On the other hand, the change in the educational paradigm that involves focusing on competencies and the implementation of a prioritized curriculum can generate resistance among educators and educational institutions. Adapting to new pedagogical methodologies and approaches can be challenging, especially for those used to more traditional approaches. Teacher training and professional development are critical to overcoming these difficulties. However, in many cases, these resources may be insufficient, making successful implementation of the curriculum difficult. In addition, establishing adequate evaluation and monitoring mechanisms can be challenging, especially in an education system with limited resources, which makes it difficult to identify and correct problems or deficiencies in the process.

Addressing socioeconomic inequalities in Ecuador is another important challenge when implementing a prioritized curriculum. These gaps can affect the quality of education and access to educational resources in different areas of the country. The equitable implementation of the prioritized curriculum must ensure that all students have the same opportunities to learn and develop the required competencies. In addition, the participation and collaboration of multiple stakeholders, such as educators, administrators, students, parents, and community representatives, is crucial to guarantee the

success of the implementation. Effective communication and shared commitment between these actors can help overcome difficulties associated with adjustments to study programs and reorganization of subject content.

Likewise, after the results of the tests (ERCE 2019) at the high school level in Ecuador, in relation to the natural sciences, the main challenges to be faced can be identified. One is to address achievement gaps between students from different regions, types of educational institutions, and socioeconomic levels. To face this challenge, it is crucial to guarantee an equitable distribution of educational resources and improve the quality of teaching in all areas and contexts of the country.

Another significant challenge is the quality of teaching in the natural sciences. It is essential to strengthen the training and professional development of teachers in this area, promoting the implementation of effective pedagogical methods adapted to the needs of students. In addition, interdisciplinary teaching and the integration of theory with practice should be encouraged, encouraging critical thinking and project-based learning to improve student performance in natural sciences.

In addition, it should be considered that one of the main reasons why there is a knowledge gap between the graduation profile of the Ecuadorian baccalaureate and the profile for entering higher education is the lack of alignment between the contents and skills taught in the baccalaureate and the expectations and requirements of higher education institutions. This discrepancy may be due to content-focused teaching rather than competency-focused teaching, which hinders the development of critical skills and the practical application of knowledge, essential aspects for success in higher education. Another important reason is the inequality in the quality of education throughout the country. Differences in resources, infrastructure, and teacher training between educational institutions and regions can lead to gaps in student achievement and preparation. This is reflected in the transition to higher education, where students may face academic and adjustment challenges due to a lack of preparation prior to high school. Therefore, it is essential to address these inequities and work on curriculum alignment to ensure a smoother and more successful transition to higher education.

CONCLUSIONS

In conclusion, the curricular importance of chemistry in higher education and the prioritized curriculum with emphasis on competencies at the high school level of the Ecuadorian Ministry of Education lies in its ability to develop essential skills, knowledge, and attitudes in students. Chemistry is fundamental to understanding the world around us and has practical applications in various fields, such as medicine, energy, industry, and the environment. The inclusion of chemistry in the curriculum and the focus on competencies ensures that students acquire practical and analytical skills, as well as a solid understanding of theoretical concepts. This allows them to be better prepared to face future academic and professional challenges, contributing to the socioeconomic and sustainable development of the country.

The use of appropriate pedagogical methodologies, such as problem-based learning, cooperative learning, the experimental approach and the integration of information and communication technologies (ICT), enriches the learning experience and improves the quality of teaching in chemistry. The formative and competency assessment allows students to receive continuous feedback and adapt their learning according to their needs and progress. Chemistry plays a fundamental role in higher education and high school in Ecuador. By focusing on the development of competencies and applying effective pedagogical strategies, it can be ensured that students acquire the necessary skills and knowledge to succeed in their future studies and careers, and to face global challenges in an increasingly interconnected and knowledge-based society. in knowledge.

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Task	% of contribution of each author	
	A1	A2
A. theoretical and conceptual foundations and problematization:	60%	40%
B. data research and statistical analysis:	60%	40%
C. elaboration of figures and tables:	60%	40%
D. drafting, reviewing and writing of the text:	40%	60%
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