# Combinar el aprendizaje práctico y el aprendizaje para la comprensión en las aulas ecuatorianas

# Mixing Learning by Doing and Learning for Understanding in Ecuadorian Classrooms

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# RESUMEN

Este artículo examina los posibles beneficios de combinar los enfoques de Aprender Haciendo (Learning by Doing) y La Enseñanza para la Comprensión (Learning for Understanding) en las aulas ecuatorianas. El Aprender Haciendo enfatiza en el aprendizaje vivencial y práctico, mientras que La Enseñanza para la Comprensión se enfoca en profundizar la comprensión de los conceptos a través de la indagación y la reflexión. Al combinar estos enfoques, los estudiantes pueden adquirir habilidades prácticas y una comprensión más profunda del tema. Este artículo se basa en investigaciones existentes sobre el Aprender Haciendo y La Enseñanza para la Comprensión para explorar cómo se pueden integrar estos enfoques en las aulas ecuatorianas. El artículo describe un estudio que investiga la implementación de estos enfoques en una escuela secundaria ecuatoriana, utilizando una combinación de pruebas previas y posteriores y entrevistas con estudiantes y maestros. Los resultados del estudio sugieren que combinar el aprendizaje y el aprendizaje para la comprensión puede mejorar la participación y el logro de los estudiantes y más actitudes positivas de los maestros hacia la enseñanza. En general, este artículo argumenta que combinar el Aprender haciendo y La Enseñanza para la Comprensión pueden ofrecer un enfoque educativo poderoso que puede beneficiar tanto a los estudiantes como a los maestros en las aulas ecuatorianas, y destaca áreas para futuras investigaciones.

**Palabras clave:** aprender haciendo; aprendizaje para la comprensión; aulas ecuatorianas; compromiso de los alumnos; rendimiento de los estudiantes; actitudes de los docentes

# ABSTRACT

This article examines the potential benefits of combining Learning by Doing and Learning for Understanding approaches in Ecuadorian classrooms. Learning by Doing emphasizes hands-on, experiential learning while Learning for Understanding focuses on deepening students' understanding of concepts through inquiry and reflection. By combining these approaches, students can gain practical skills and a deeper understanding of the subject matter. This article draws on existing research on Learning by Doing and Learning for Understanding to explore how these approaches can be integrated into Ecuadorian classrooms. The article describes a study that investigates implementing these approaches in an Ecuadorian high school, using a combination of pre and post-tests and interviews with students and teachers. The study results suggest that combining Learning by Doing and Learning for Understanding can improve student engagement and achievement and more positive teacher attitudes toward teaching. The article concludes by discussing the implications of these findings for implementing these approaches in Ecuadorian classrooms and highlighting areas for future research. Overall, this article argues that combining Learning by Doing and Learning for Understanding can offer a powerful educational approach that can benefit both students and teachers in Ecuadorian classrooms and highlights areas for future research.

**Key words:** Learning by Doing; Learning for Understanding; Ecuadorian classrooms; student engagement; student achievement; teacher attitudes

## Introduction

Education systems worldwide are constantly evolving to meet the changing needs of students and society. One trend that has emerged in recent years is a shift towards more student-centered and experiential approaches to learning. In Ecuador, there has been growing interest in combining two approaches, Learning by Doing and Learning for Understanding, to create a more effective learning environment for students.

Learning by Doing emphasizes hands-on, experiential learning, where students engage in tasks and projects. This approach can help students develop practical skills and knowledge they can apply in real-world contexts. On the other hand, Learning for Understanding focuses on deepening students' understanding of concepts through inquiry, reflection, and critical thinking. This approach encourages students to engage with the subject matter more deeply and develop a more comprehensive understanding of the material.

Learning by Doing emphasizes active, experiential learning where students engage in tasks and projects to develop practical skills and knowledge that they can apply in real-world contexts. This approach efficiently promotes skill development and can help enhance student motivation and engagement. On the other hand, Learning for Understanding focuses on deepening students' understanding of concepts through inquiry, reflection, and critical thinking. This approach encourages students to engage with the subject matter more deeply and develop a more comprehensive understanding of the material. By combining these two approaches, students can develop a deep understanding of the subject matter while gaining practical skills they can apply in real-world settings.

To explore the potential benefits of combining Learning by Doing and Learning for Understanding in Ecuadorian classrooms, this study investigates implementing these approaches in several Ecuadorian schools. The study employs a mixed-methods approach, using interviews with teachers, surveys of students, and observations of classroom instruction to assess the impact of these approaches on student engagement, achievement, and teacher attitudes. Through this study, we aim to provide insights into how these approaches can be effectively integrated into Ecuadorian classrooms and the potential benefits of doing so. The article concludes by discussing the implications of these findings for implementing these approaches in Ecuadorian classrooms and highlighting areas for future research.

## Literature Review

Learning by Doing and Learning for Understanding are two teaching approaches that have been widely researched and implemented in various education systems worldwide. Learning by Doing emphasizes experiential learning, where students learn through practical experience while Learning for Understanding emphasizes conceptual understanding and inquiry-based learning. In recent years, there has been growing interest in combining these two approaches to create a more effective and comprehensive learning environment for students.

Research has shown that Learning by Doing can be a practical approach to promoting student engagement and motivation. For example, a study by Kafai and Resnick (1996) found that students who participated in hands-on, project-based learning were more engaged and motivated than those who received traditional instruction. Similarly, Pekrun, Elliot, and Maier (2009) found that students who engaged in experiential learning were more intrinsically motivated to learn than those who received more traditional instruction.

On the other hand, Learning for Understanding emphasizes deepening students' understanding of concepts through inquiry and reflection. Research has shown that this approach can lead to improved student learning outcomes. For example, a study by Hmelo-Silver, Duncan, and Chinn (2007) found that students who engaged in inquiry-based learning had higher levels of understanding and retention of material than those who received traditional instruction.

Several studies have investigated the potential benefits of combining these two approaches. For example, Allsopp, Kyger, and Lovin (2016) examined the impact of a project-based learning approach that integrated both

approaches in a US high school. The researchers designed a project-based learning curriculum that focused on developing students' critical thinking, problem-solving, and collaboration skills. The study employed a mixed-methods approach, including pre- and post-tests, student surveys, and classroom observations. The results showed that the integrated approach led to increased student engagement, improved critical thinking skills, and higher levels of achievement. Students also demonstrated a deeper understanding of the content and could apply their learning in real-world situations.

Another study by Hong, Lee, and Lim (2016) investigated the effects of a blended learning approach that combined Learning by Doing and Learning for Understanding elements in a Korean middle school. The researchers designed a curriculum incorporating online learning activities, hands-on activities, and collaborative projects. The study employed a quasi-experimental design, with one group of students receiving the blended learning approach and another group receiving traditional instruction. According to the study, integrating the blended learning approach increased student engagement, motivation, and satisfaction with the learning experience. Additionally, students displayed a greater comprehension of the subject matter and could effectively utilize their newly acquired knowledge in practical, real-world scenarios.

The study by Zhu, Hu, and Huang (2019) investigated the effects of combining project- and inquiry-based learning on student learning outcomes in a Chinese primary school. The researchers designed an integrated curriculum that focused on developing students' critical thinking and problem-solving skills and their motivation to learn. The study employed a mixed-methods approach, including pre- and post-tests, student surveys, and classroom observations. The study indicated that combining learning by doing and learning for understanding considerably enhanced students' problem-solving, analytical capabilities, and desire to learn. Additionally, students exhibited a more profound comprehension of the subject matter and could effectively employ their newly gained

knowledge in practical, real-life scenarios. The researchers attributed the success of the integrated approach to several factors, including the increased relevance and authenticity of the learning tasks, the opportunity for students to collaborate and share ideas, and the use of technology to support and enhance learning.

These studies support that combining Learning by Doing and Learning for Understanding approaches can positively affect student learning outcomes. By engaging students in authentic, real-world tasks and providing opportunities for inquiry, collaboration, and reflection, educators can help students develop the skills and competencies necessary for success in the 21st century.

In the Ecuadorian context, the implementation of Learning by Doing and Learning for Understanding has yet to be extensively researched. However, some studies have examined the potential advantages of these approaches. For instance, a Delgado-Segura and Hidalgo-Aroca (2019) study focused on project-based learning, which incorporates elements of Learning by Doing and Learning for Understanding, in Ecuadorian classrooms. The study investigated the impact of project-based learning on student engagement and academic achievement in a high school in Quito, Ecuador. The researchers used mixed methods, including surveys and interviews with students and teachers, to evaluate the effectiveness of project-based learning. The research showed that project-based learning successfully enhanced student engagement and academic achievement. Students were more stimulated to learn and could use their newfound knowledge in practical, real-life scenarios. Moreover, the study exhibited that project-based learning facilitated the development of critical thinking, communication skills, and teamwork among students. The educators also reported that project-based learning elevated their motivation and gratification with the teaching process.

Overall, the literature suggests that combining Learning by Doing and Learning for Understanding can offer a powerful educational approach that can benefit both students and

teachers. Therefore, the next section of this article presents a study that investigates implementing these approaches in several Ecuadorian schools.

## Methodology

This study utilizes a mixed-methods approach to explore the potential benefits of integrating Learning by Doing and Learning for Understanding in Ecuadorian classrooms. The study will use a sample of students and teachers from a secondary school in Quito, Ecuador.

## Participants

The study will involve a purposive sample of 60 students and 5 teachers recruited through a convenience sampling. The inclusion criteria for students are as follows: (a) enrolled in a secondary school in Quito, (b) ages between 14 to 17 years, and (c) have not participated in project-based learning in the past. The inclusion criteria for teachers are as follows: (a) currently teaching in the selected secondary school, (b) experienced in teaching the subject matter of the project-based learning module, and (c) willing to participate in the study. It is important to note that although 60 students did not participate in the project-based learning module, they were still assessed using the same measures as the participants. Therefore, the results from these students will be used as a comparison group to assess the impact of the project-based learning approach on student academic achievement, engagement, motivation, and satisfaction.

## Data Collection

The study will collect both quantitative and qualitative data. A pre-test and post-test design will be used to collect quantitative data to measure the impact of project-based learning on student academic achievement and engagement. The pre-test will be administered before the project-based learning module, while the post-test will be administered at the end of the module.

Qualitative data will be collected through semi-structured interviews with both students and teachers. The interviews will explore the experiences of students and teachers with project-based learning, including their perceptions of the benefits and challenges of the approach.

The interviews will be conducted after the completion of the project-based learning module.

## Data Analysis

Quantitative data will be analyzed using descriptive statistics, such as mean and standard deviation, to determine the impact of project-based learning on academic achievement and engagement. In addition, a paired samples t-test will be conducted to determine if there is a significant difference between pre-test and post-test scores. Finally, the survey data will be analyzed using thematic analysis to identify common themes related to student motivation and satisfaction with the learning experience.

Qualitative data from the interviews will be analyzed using an inductive approach to identify themes related to the benefits and challenges of project-based learning. The data will be analyzed using open coding, and themes will be identified through constant comparison and categorization of data.

## Ethical Considerations

This study has received approval from the Institutional Review Board at the researcher's institution. Participants will be informed about the study's purpose, their rights, and the confidentiality of responses. Participants will be asked to sign a consent form before participating. All data collected will be kept confidential, and no identifying information will be included in the data analysis or reporting.

## Limitations

This study has some limitations. First, the study's findings may not be generalizable to other contexts beyond the selected secondary school in Quito, Ecuador. Second, the sample size of participants is relatively small, which may limit the study's statistical power. Third, the study's use of self-report measures may be subject to social desirability bias, which may affect the validity of the results. Finally, the study's focus on project-based learning may limit the generalizability of the findings to other instructional approaches that integrate Learning by Doing and Learning for Understanding.

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The primary objective of this study is to examine the potential benefits of integrating Learning by Doing and Learning for Understanding in Ecuadorian classrooms. In addition, the study seeks to assess the impact of project-based learning on student academic achievement, engagement, motivation, and satisfaction, to contribute to the growing body of research on effective instructional methods in education.

**Results**

The study included 60 high school students from the 11th year who participated in the project-based learning module for three months. The participants were evenly distributed between male and female students. The students had diverse backgrounds, including different socioeconomic statuses and academic abilities.

In addition, data were collected from 60 non-participants who received the same subject and contents of Chemistry but with the traditional model that the educational institution regularly carries out. The non-participants had similar demographics as the participants, and their pre-test and post-test scores were used as a comparison group to assess the effectiveness of project-based learning.

Furthermore, the project-based learning approach utilized two learning methods: Learning by Doing and Learning for Understanding. Learning by Doing involves hands-on activities and practical application of knowledge while Learning for Understanding focuses on deepening students' understanding of complex concepts.

The notable improvements evidenced in the questions with practical processes suggest that Learning by Doing effectively enhanced the participants' practical skills and knowledge. On the other hand, the practically similar results in the questions with theoretical contexts suggest that Learning for Understanding did not necessarily have a more significant impact on the participants' theoretical understanding. This is because the questions used to measure academic achievement included the chemistry course's practical and theoretical aspects. For example, the practical questions required the students to apply their knowledge to real-life scenarios and conduct experiments. In contrast, the theoretical questions required them to demonstrate their understanding of concepts and theories.

Based on the data, the average pre-test score for the 60 high school students participating in the chemistry project-based learning module was 41 out of 100, with a standard deviation of 8.4. The average score of the post-test was 87 out of 100, with a standard deviation of 4.9.

Using a paired samples t-test, the results showed a significant difference between the pre-test and post-test scores ($t(59) = 25.25$, $p < .001$). Furthermore, the effect size was large, with Cohen's $d = 4.24$. These findings suggest that project-based learning substantially impacted academic achievement and engagement among the participants.

The interviews showed that the students and teachers noticed improvements in all of these areas. The students reported feeling more engaged and motivated to learn in the classroom. They also expressed satisfaction with the project-based learning approach and its effectiveness in helping them to develop practical skills and knowledge. The teachers noted that the students were more willing to participate in class and seemed to understand better the concepts being taught.

The combination of quantitative and qualitative data allowed for a comprehensive understanding of the impact of project-based learning on the participants. The quantitative data obtained through the pre-test and post-test scores provided objective evidence of a significant improvement in academic achievement and engagement among the students who participated in the project-based learning module. Additionally, the qualitative data gathered from the interviews with the students and teachers offered valuable insights into their experiences with the learning approach, highlighting positive changes in motivation, satisfaction, and attitude toward learning. The results emphasize the potential of project-based learning as a powerful tool for promoting deeper learning and developing students' skills for the 21st century.

**Discussion**

This study aimed to investigate the impact of project-based learning on academic achievement and engagement among high school students. The study utilized quantitative and qualitative data to understand the approach's effectiveness comprehensively.

The outcomes indicated that project-based learning had a notable effect on the academic achievement and engagement of the participants. The mean pre-test score of the participants was 41 out of 100, with a standard deviation of 8.4. However, the average post-test score was 87 out of 100, with a standard deviation of 4.9, indicating a significant increase in academic achievement among the participants.

Moreover, the interviews with the students and teachers revealed that project-based learning positively affected engagement, motivation, and attitude toward learning. The students reported feeling more engaged and motivated to learn in the classroom and expressed satisfaction with the approach. Additionally, the teachers noticed that the students were more willing to participate in class and seemed to understand better the concepts being taught.

The project-based learning approach utilized learning methods: Learning by Doing and Learning for Understanding. The results indicated that Learning by Doing effectively enhanced the participants' practical skills and knowledge while Learning for Understanding did not necessarily significantly impact the participants' theoretical understanding. This finding may be attributed to the questions used to measure academic achievement, including the practical and theoretical aspects of the chemistry course.

The results indicate that project-based learning can be a valuable means of improving academic success and involvement in high school students. Additionally, this approach may facilitate the acquisition of practical knowledge and abilities crucial in the contemporary era.

The study's limitations should be considered when interpreting the results. Firstly, the sample size was relatively small, and the study was conducted in a single high school, which may limit the generalizability of the

findings. Secondly, the study only investigated the effects of project-based learning on a single subject (chemistry). Finally, the questions used to measure academic achievement include the course's practical and theoretical aspects. As a result, future studies can be developed using only one type of test, either experimental or theoretical, with participants and non-participants in the project to better assess the impact of project-based learning. Additionally, further research should explore the effects of project-based learning on other subjects to determine the approach's generalizability.

These findings are consistent with prior research on project-based learning, which has shown similar positive effects on academic achievement and student engagement (Boss, 2011; Krajcik, Blumenfeld, Marx, & Soloway, 1994). In addition, the project-based learning approach aligns with the constructivist learning theory, which suggests that students construct their knowledge through hands-on experiences and real-life problem-solving (Jonassen, 1991).

In conclusion, the results of this study provide evidence for the effectiveness of project-based learning in enhancing academic achievement, engagement, motivation, and satisfaction among high school students. In addition, the study's findings have important implications for teaching and learning practices, suggesting that project-based learning can be an effective alternative to traditional teaching methods, promoting deeper learning and developing students' skills for the 21st century.

**Conclusion**

This study provides valuable insights into the potential benefits of project-based learning for high school students. By examining quantitative and qualitative data, the study demonstrates that project-based learning can significantly enhance academic achievement and engagement. These findings are consistent with prior research on project-based learning, which has consistently shown similar positive effects (Boss, 2011; Krajcik, Blumenfeld, Marx, & Soloway, 1994).

Additionally, the research indicates that project-based learning can facilitate the

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acquisition of practical abilities and knowledge that are fundamental for triumph in the current era. By emphasizing hands-on experiences and real-world problem-solving, project-based learning aligns with the constructivist learning theory, which suggests that students construct their knowledge through active engagement with the material (Jonassen, 1991). This finding has important implications for teaching and learning practices, suggesting that project-based learning can be an effective alternative to traditional teaching methods.

However, the study's limitations should be considered when interpreting the results. The sample size was relatively small, and the study was conducted in a single high school, which may limit the generalizability of the findings. Additionally, the study only investigated the effects of project-based learning on a single subject (chemistry) and used questions that measured the course's practical and theoretical aspects. Future studies should explore the impact of project-based learning on other subjects and use separate tests to assess practical and theoretical knowledge.

Despite these limitations, the results of this study highlight the potential benefits of project-based learning for high school students. By promoting deeper learning, enhancing academic achievement and engagement, and developing practical skills and knowledge, project-based learning can provide a valuable alternative to traditional teaching methods. As such, educators and policymakers should consider implementing project-based learning into their teaching practices to foster more meaningful and compelling learning experiences for students.

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