Effects of the Implementation of Inquiry-Based Learning

in Relation to Students' Autonomy

Case Study

Thomas Andrey Arias Cardenas & Margarita Rosa Obregón Alvarez

Submitted as a Requirement for the Bachelor of Education in Teaching Foreign Languages

Thesis, Research and Practicum Advisor

Mrs. Natalia Arias Patiño, Mg in Foreign Language Teaching and Learning

Universidad de Antioquia

School of Languages

Foreign Language Teaching Program

Medellín

2024

Dedication and Acknowledgements

Este proyecto de grado es dedicado a nuestros estudiantes del colegio Avelino Saldarriaga, quienes en poco tiempo se ganaron nuestro aprecio y gratitud, y que fueron quienes nos motivaron a seguir hasta el final, con sus ganas de aprender y su actitud.

Empezamos, entonces, agradeciendo a nuestros padres, sin los cuales este trabajo, ni nada más, sería posible; a nuestros amigos, encontrados antes o durante la carrera, que con sus charlas y consejos lograron animarnos en momentos difíciles; a muchos compañeros que tuvimos en el camino, quienes nos aportaron conocimientos y opiniones; a los profesores universitarios, que hicieron su esfuerzo para educarnos en el arte de educar; a nuestra asesora de prácticas, quien tuvo que aguantarnos durante todo el difícil proceso, y nos guio de la mejor forma posible; al Avelino Saldarriaga, sus coordinadores, profesores y demás, quienes nos abrieron las puertas y nos prestaron su apoyo siempre que lo necesitamos; a nuestro profesor cooperador, que se convirtió en un apoyo, un compañero, y un referente; a todos los participantes y quienes nos ayudaron en este trabajo, pues hicieron de nuestro proyecto una realidad.

De parte de Margarita a Thomas, un agradecimiento por acogerla en este trabajo y dejarla enseñar junto a él. De parte de Thomas a Margarita, un agradecimiento por darle a este trabajo, a la investigación y a todo el proceso, un sentido real y hacer la experiencia mucho más disfrutable.

Table of Contents

Abstract

The following Case Study delves into the effects on autonomy when using Inquiry-based Learning with 10th and 11th grade students, at a public school located in Itagüí. As a part of a new initiative called *Investigación Escolar*, the school tasked students with developing their own research projects, partaking in a Problem-based Learning approach complemented by a Collaborative Learning approach, openly choosing issues related to their environment and working in small groups. Given this is a cross-curricular approach, students had to add to their research projects from all school subjects, guided by their teacher's instructions. We performed class observations, interviewed teachers that were directly involved with the implementation of this pedagogical innovation, analyzed students' logbooks and their responses to questionnaires, looking to study students' process during the development of their research projects, as well as teachers' and students' perceptions in terms of students' autonomy. Doing so, we were able to verify that, during the school year, working on their projects, students became less dependent on their teachers, and their interest in their learning process increased.

Key words: Investigación Escolar, Inquiry-based Learning, Problem-based Learning, Collaborative Learning, autonomy.

Resumen

El siguiente Estudio de Caso profundiza en los efectos sobre la autonomía al utilizar el Aprendizaje Basado en Investigación con estudiantes de grado 10º y 11º, en un colegio público ubicado en Itagüí. Como parte de una nueva iniciativa denominada Investigación Escolar, el colegio asignó a los estudiantes desarrollar sus propios proyectos de investigación, participando en un enfoque de Aprendizaje Basado en Problemas complementado con un enfoque de Aprendizaje Colaborativo, eligiendo abiertamente temas relacionados con su entorno y trabajando en pequeños grupos. Dado que se trata de un enfoque transversal, los alumnos debían añadir a sus proyectos de investigación de todas las asignaturas escolares, guiados por las instrucciones de sus profesores. Realizamos observaciones de clase, entrevistamos a los profesores que participaron directamente en la puesta en práctica de esta innovación pedagógica, analizamos los cuadernos de bitácora de los alumnos y sus respuestas a los cuestionarios, buscando estudiar el proceso de los alumnos durante el desarrollo de sus proyectos de investigación, así como las percepciones de profesores y alumnos en cuanto a la autonomía de los estudiantes. De este modo, pudimos comprobar que, a lo largo del año escolar, trabajando en sus proyectos, los alumnos se volvieron menos dependientes de sus profesores y aumentó su interés por su proceso de aprendizaje.

Palabras clave: Investigación Escolar, Aprendizaje Basado en la Indagación, Aprendizaje Basado en Problemas, Aprendizaje Colaborativo, autonomía.

Introduction

Education is always evolving, looking to adapt to challenging environments and students. This was the case of the Avelino Saldarriaga school, which found in inquiry an innovation strategy to complement their pedagogical model. Using the name of *Investigación Escolar,* this model was built up on the concepts of Inquiry-Based Learning, Problem-Based Learning, and Collaborative Learning, as it focuses on a Student-Centered Approach. This idea required a great level of autonomy from students, given that this model was mostly self-directed. Taking this into account, this research project took place to examine if the School Project was having any effect in relation to students' autonomy. To collect the information needed, interviews with teachers and questionnaires to students were implemented at two moments of the year, one around April and the other in September, and students' productions were analyzed with a checklist filled by teachers by the time of September.

Description of the Context

School

The educational institution where this research project was carried out was the Institución Educativa Avelino Saldarriaga, which is a public school located in Itagüí, Antioquia, Colombia. This school has three different headquarters, having its principal one in La Independencia neighborhood, where students receive education from preschool to 11th grade. The other two headquarters are in the Unión and Olivares neighborhoods, both in Itagüí.

The Olivares neighborhood had been plagued with a lot of problems since the community started to form, some of them related to drug addiction. With these issues in mind, the institution

was created for kids to stay there and learn something, or just spend time, as they could not go to school because of the community's problems. With time, this place started growing and now it is certified as a school. The Unión headquarters receives students from preschool and primary school (I.E Avelino Saldarriaga, n.d.).

During our stay, we focused on students in secondary school, which had 6 hours of class every day, 5 days a week, with 4 hours of English class per week (PEI, 2023). On our arrival, the school's English syllabus had been changed a couple of times, but it did not have a methodology or content established. This syllabus is more related to competences and skills students should have by the end of the school year, but no language or cultural content is present. Content is up to the decision of the teacher (I. E. Avelino Saldarriaga, 2022).

Before continuing, it's important to clarify that, although this report will make part of the Universidad de Antioquia's School of Languages, this study was not focused on English teaching. In the past, students from the 1475 Bachelor in Education in Teaching Foreign Languages were required to research their language class, partaking in action research, but since the implementation of the new program (1476), we were given the chance to choose among different types of studies, so we decided to focus on a School Project was it was transversal for all school subjects, not just the English class.

School Project

The school has a project, a general project, for all grades and subjects, named *Investigación Escolar* (School Research). The School Project was proposed to empower students to learn content and acquire skills through research. In general terms, over the course of a school year, students were allowed to choose topics of interest (usually a problem in their community or school), search

for information about the problem, see how it affected their community, look for causes and consequences of the problem, and propose a solution. Students were also given the choice whether to continue with their research and expand it during the next year, or to choose another problem to research. The idea was for students to create something alluding to a scientific article (Personal Communication with the academic coordinator, August 14th, 2023).

Regarding the implementation of *Investigación Escolar,* it was not mandatory for every class to have activities related to the project. Teachers were free to plan their classes as they wanted to, covering their content, but they were required to use some of the class time, following guidelines from the school administration, to work on the School Project.

First Tuesday of every month, meetings about *Investigación Escolar* took place at *Secretaría de Educación* Itagüí. These meetings, known as *Mesa de Investigación Escolar,* had the purpose of sharing initiatives, experiences or readings that the representatives of five schools from Itagüí were working on in relation to *Investigación Escolar* (Mesa de Investigación Escolar, August 6th, 2024). By the end of this study, the *Mesa de Investigación Escolar* was still having place, and it was set to continue working in 2025 (Mesa de Investigación Educativa, September 3rd, 2024).

Participants

The participants consisted of two teachers, four small groups of students from 10th grade, and two small groups of students from 11th grade.

Students

The students were part of three classes. We chose two groups from each class. That is, two groups from 10°1, two from 10°2, and two from 11°2. The main reason for choosing this sample was that we partook in teaching some of their English classes, so it was easier to get information from them. Their ages ranged between fifteen and seventeen years old. They were eleven students from neighborhoods that are moderately near to the school, in strata ranging from 1 to 3. Most of them were part of the school before the School Project was implemented, but ¼ of them entered the school while the School Project was being carried out (Personal communications with students, 2024).

The perception of the students about the project varied from one student to another, but they had many thoughts in common. When first approaching students at the beginning of our practicum, most of them said they believed the project helped them understand some general problems within their classroom, school, or community. Most of the students considered that the School Project was demanding and that it took a lot of time, as it was to be developed throughout the whole year. Most of the students thought that the project was interesting, but 10-20% of them thought that it was boring and that they preferred other kinds of activities. Students had the idea that the project was made to improve the condition of the school and its environment (Students' Questionnaire, August 4th, 2023).

Teachers

We interviewed two teachers from 10th and 11th grade, who will be referred to as Teacher 1 and Teacher 2, the first one a Natural Sciences teacher and the leader of the implementation of *Investigación Escolar*, who also attended *Mesa de Investigación Escolar* and had a bast

theoretical knowledge on the pedagogical innovation. The latter an English teacher who was also our Cooperating Teacher and the English subject leader. Both had teaching degrees in their correspondent area, and both had been teaching in the school for more than 8 years. To help students with their process, teachers regularly held formative school meetings regarding the implementation of the School Project (Personal Communication with teachers, October 30th, 2023).

Justification

Below, we will present the reasons why the school chose to implement *Investigación Escolar* as the pedagogical model of the school, and why we decided to do our research around this topic.

Regarding the implementation of *Investigación Escolar*, between 2020 and 2021, there were different situations related to the pandemic and the uncertain remodel of the school, that made a considerable number of students fail many subjects at the same time. With that in mind, teachers and coordinators agreed that it was too difficult for a student to compensate for different subjects in a short period of time. So, they created a broad task that involved all the failed subjects, so the students only had to accomplish one great assignment. The idea was liked by administrators and teachers, so they decided to implement something similar for all the students. Then, instead of being a way of recovery, this initiative was transformed into *Investigación Escolar,* a innovative strategy for the institution, where all students worked on a task that could be connected to their own realities, integrating all of their school subjects (Teacher's Interview, April 3rd, 2024).

The School Project was based on academic research methodologies, using a Problem-based Learning approach, complemented by a Collaborative Learning approach. As this research-

focused methodology was considerably new, and the school merged different concepts into *Investigación Escolar,* the English theoretical concept we found was closer to this way of teaching was Inquiry-Based Learning. The School Project intended students to gain knowledge on the corresponding subjects, elaborate a diagnosis of learning needs, and work collaboratively (PEI, 2023), considering the acquisition of knowledge, and the development of skills and attitudes with equal importance. In this project, students worked in small groups to find, analyze and solve a problem with the aid of a teacher tutor.

To justify the creation and development of the project, the school centered on the cognitive, academic, and social competences and skills that the students should develop. This project was created with the intention of developing citizens that were capable of being useful, responsible, conscious, and principled for society. One of the main skills was autonomy, as students should be able to direct their own research project. They were to identify a problem, understand it, collect information, produce a solution, and interpret the results to write a conclusion. Other skills and competences that should be improved were verbal, written, and artistic expression, interactive processes, and collective construction of knowledge (PEI, 2023).

This school project also had a vast municipal interest, as one of the lines of educational innovations. Even though all the teachers from Avelino Saldarriaga had participated in workshops regularly, they were encouraged to implement *Investigación Escolar* from their experience and knowledge, without needing outsiders to tell the school what to do. *The Secretaría de Educación* found that, in pedagogical terms, the school was advancing and that the school project was working towards students' commitment (Mesa de Investigación Educativa, September 3rd, 2024).

Considering our decision to do research on the implementation of the school project, one of us had been part of this school since he was in 1st grade, the school was part of his history and, back at the time of the study, some of the teachers that worked there were his friends. The institution was meaningful to him, he knew that it had positive and negative points, advantages, and problems. When he left the school, *Investigación Escolar* still was not implemented, so he had a personal interest in understanding if the project was helping in the development of the students' autonomy or if it was not having the expected results. The project seemed innovative yet ambitious, and it could be a challenge for students and teachers to follow the process, as it was a new initiative. One semester after starting this process, another person was added to the project. She did not know the school, nor the School Project, but soon she liked the school and got interested in the School Project. She also wondered if what the school was implementing was working and how students were performing in a methodology that implied responsibility and too much self-directed work. That was why we wanted to know if the students developed the autonomy needed to accomplish such a project and why.

We started to do our practicum in this institution at a confusing time, the School Project was already being carried out, but it was too recent. It did not have a stablished, finished curriculum by 2023. At first, the plan was to do any project related to the English course, but the School Project seemed too interesting to us, so we started to talk with teachers, coordinators, and students to get information. We decided to do school research instead of focusing on the English subject but on the implementation of the project. Very soon we realized that our participation in the school project was going to be minimal. Nevertheless, we got as involved as we could. For instance, we participated in workshops, the *Mesa de Investigación Escolar,* presentations from students, among others, but we could not observe a class where the School Project was being explored. We gathered

students' work and their perceptions, additionally to teachers' thoughts and perceptions, and their evaluation on students' work.

To do research is a necessity for humans, it is to question how we see the world, and how it works, and to know the world is to be in the world, to be part of it, and even become the world itself (Manen, 2003). I.E. Avelino Saldarriaga understood that, and comprehended, also, that school was the best place in which people could question, criticize, comprehend, interpret, analyze. We think that understanding the implementation of *Investigación Escolar* in this context and its effect in relation to students' autonomy could teach us about innovative ways of teaching in which the interests and context of the students are linked to the learning process. We are hopeful that teachers, coordinators and other agents use this report to see the ways in which the School Project is helpful to students' autonomy, or if there are still some actions that could be done in better ways. Also, the school could share this report with the *Mesa de Investigación Escolar* to see if it could help other institutions that are using the same pedagogical model or similar ones.

Research Question

What effects does the implementation of Inquiry-Based Learning, at a public school in Itagüí, have in relation to students' autonomy?

Objectives

General Objective

To analyze students' autonomy in a school that uses Inquiry-Based Learning

Specific Objectives

- To analyze students' process in the development of their research project, regarding their autonomy following the main concepts in IBL.
- To understand teachers' perceptions about the school project in terms of the development of students' autonomy.
- To understand students' perceptions about the school project in terms of the development of their autonomy.

Theoretical Framework

Inquiry-Based Learning (IBL)

According to Pedaste et al. (2015), through Inquiry-based learning, students are able to discover and construct knowledge by formulating hypotheses and testing them, be it by conducting experiments and/or making observations. This educational strategy allows students to develop their problem-solving skills, as they become active participants in a self-directed, partly inductive, and partly deductive learning process.

Implementing IBL steers students to take responsibility for their learning, as they explore and investigate. They are expected to make decisions and reach conclusions and judgments, which enhances their critical thinking skills (Jonassen, 2000, as cited in Gholam, 2019). Amongst other benefits, students find joy in discovering what they are curious about and develop stronger ideas about the world, while they use their own thinking and reasoning to learn. According to Harlen (2013, as cited in Gholam, 2019), this hands-on approach fosters enjoyment, satisfaction, and curiosity, helping students build a deeper understanding of their surroundings.

Problem-Based Learning (PBL)

In general terms, Problem-based Learning is a student-centered teaching approach in which students focus on a problem, construct a question related to the problem, and center their learning process around that question (Schwartz et al., 2007). The objective of PBL is not only to solve the problem, but to understand it, analyze it, and research in deep all the aspects involved in it.

Setlight et al. (2023) state that the principal characteristic of PBL is that it is related to real life events and the context of the students, as the learning process should be meaningful and important for them. Students pay attention to situations they can observe and, eventually, they would arrive at a solution or conclusion. Another characteristic of this approach is that it is usually done in groups, where students work together to debate and contribute to the development of their question.

The development of PBL in classrooms could be done in a sequence of events. First, the teacher gives students a problem surrounding their context, or students choose the problem by themselves, and they analyze the details around the topic. Then, in groups, students share their understanding of the issue and discuss how they could arrive at a solution. Having thought on a solution, students start an investigation around the problem to see if their interpretation of it and their solution is adequate and real. After that, students implement their solution, present it to the class, orally or written, and get results. At last, students analyze their results and their procedure to get to final conclusions and see how pertinent their solution was, if the results were significant or not (Amin et al, 2020).

This approach searches for active students that can find their own knowledge, to understand their environment, the problems that it has, and what they can do to change that situation. PBL

increases critical thinking skills, interpersonal skills, and social responsibility in students, preparing them for their life in society as good and active citizens (Sumarmi et al, 2020).

Collaborative Learning (CL)

In education, Collaborative Learning (CL) refers to a way of teaching in which interaction between students is the focus. Laal and Ghodsi (2012) declare that CL connects with the philosophy that explains that humans need interaction and communication. In this method, the students are responsible for their actions, learning, and respect while they are working with their partners.

CL consists of workshops, activities, challenges, and other learning processes that must be done in groups or pairs. The role of students is to work together to accomplish a goal, solve a problem, or debate a topic, while the teachers are the ones that guide a project, give initial instructions, propose a topic, help students in their process, and give feedback. As CL is student-centered, the teacher is not the heart of the classroom, but a facilitator, helper, and guide (Wijaya, 2021).

After the analysis of these concepts, we found a clear relationship among them and how IBL, PBL and CL are integrated in education. This integration is not something new, and some authors give an idea of how it works.

Following Schwartz et al (2007), in this kind of teaching, in which the previous approaches are integrated, the teacher acts as a tutor or facilitator, while the students work on their own. This methodology is divided into steps. First, in groups, students choose a problem related to their context, even if they do not have information about it. Then, they look for information to

understand the origin of the problem and how it affects their community. After that, they create a hypothesis that could guide a solution. To finish, students reflect on how they followed the process and how they reached a conclusion.

The idea of this approach is that education and learning consist of something meaningful, real, and important for the learners, while they learn to communicate and be integrated in society (Qureshi et al, 2021).

As in every other student-centered approach, in this integrated methodology, autonomy is key to assure that students complete their learning process, as it depends on them.

Autonomy

In the education context, autonomy refers to the ability of learners to take control of their own learning process, make decisions about their learning goals, methods, and pace, and to self-regulate their learning activities (Thanasoulas, 2000). According to authors Benson and Voller (1997, as cited in Thanasoulas, 2000), the concept of autonomy in education can be approached from different perspectives, which is why it is important to make clear with which we can relate for the purposes of this research project. Not to be confused with self-instruction, autonomy shall be regarded as a set of skills which can be learned and applied in self-directed learning, as well as the exercise of learners' responsibility for their own learning. An autonomous learner creates ideas and takes advantage of learning opportunities, instead of just responding to what the teacher says, which leads them to determine the direction of their own learning. In this process, it is crucial for teachers to understand autonomy and be able to integrate it into the curriculum, whether they use self-access facilities alongside classroom teaching; yet it remains uncertain how teachers acquire this understanding, and the practical skills needed (Reinders & Balcikanli, 2011).

As this project also takes place in a language classroom, it is important to define autonomy in this field. Omaggio (1978, as cited in Thanasoulas, 2000), states that an autonomous language learner understands their own learning styles and uses strategies accordingly; they play an active part in the tasks at hand, are willing to take risks (like communicating in the L2, no matter what), are good at guessing, pay attention to both form and content, have a tolerant and outgoing attitude towards the L2, create their own way of understanding the language and are ready to change or disregard ideas and rules that don't fit.

Although learners are the only ones responsible for their actions in the learning process, they are not assumed to work in isolation, as both teacher and learners are involved in the teaching-learning outcome (Little, 2007; Nor, 2013, as cited in Ramamuruthy & Rao, 2015). In Ramamuruthy and Rao's study on smartphones' promotion of Autonomous Learning in ESL classrooms (2015), most learners recognized their English learning needs, and they used smartphones to get help and correct their mistakes. This goes hand in hand with learners' awareness and the desire to master English language, which are factors leading to autonomous learning (Joshi, 2011, as cited in Ramamuruthy et al., 2015).

Research Methodology

Case Study is a research methodology that focuses on the analysis of phenomena, something that happens to certain communities, the reasons behind these situations, and the effects, or product, after facing these phenomena (Yin, 2003). In this specific research project, this methodology served to understand the perception of teachers and students regarding autonomy. Normally, as Yin (2003) explains, case studies are seen when a community must face a significant problem and decides to do something to go through that problematic, a kind of solution, then, the

next step is to observe the possible effects that this solution had over the community. In this case, we focused our attention on the possible effects that the School Project adopted by the school was having on students' autonomy.

Our intention, then, was to understand if students were really interested in the development of the School Project, and if they had the capacity to work on their own. We wanted to see if the work they were doing reflected personal commitment to their process. And, to finish, we wanted to comprehend perceptions of students and teachers around how students were performing autonomously in their projects' activities, since the School Project implied a pedagogical model shift.

Data Collection Instruments

For the development of this research, the data collection instruments used were interviews, questionnaires, and logbooks.

Interviews

The purpose of an interview is to collect personal perceptions about a phenomenon, having a conversation with someone affected by or implicated in this phenomenon (Altrichter et al., 1993). To start, the interviews consisted of formal conversations with two teachers from 10th and 11th grade. We planned two interviews for each one of the teachers. The first interview consisted of getting ideas about how the school project had been implemented and what initial perspectives they had about autonomy in the *Investigación Escolar.* The second one was purely about students' autonomy, asking teachers if their perception had changed or not, and asking about what the possible causes were for keeping or advancing on students' autonomy.

Questionnaires

The questionnaires consisted of scaled, and some written, questions in which six groups of students, four from 10th grade and two from 11th grade, expressed themselves about their perception of their own autonomy. As with teachers, the questionnaires were divided into two, one at the beginning of April, and the other at the beginning of September. The first questionnaire was to determine how autonomous students felt with the implementation of the school project. The second questionnaire was more related to understanding what the reasons were for their interpretation of how autonomous they were based on the first questionnaire. Questionnaires were functional instruments as they assured anonymity, they could be implemented in diverse ways, paper or digital, and they could collect information from a large population easily (Salehi, 2016). collect information from a large population easily (Salehi, 2016).

Logbooks

The last data collection instrument was what the school calls *Bitácoras* (logbooks), in which students registered everything that they produced in terms of the project. We collected logbooks from the same groups selected to fill out the questionnaires to see how their process and production was, to compare their perceptions with what they really had done. To evaluate autonomy while regarding the logbooks, we prepared a final checklist, which each teacher had to fill out having the selected students' groups in mind. In this checklist, observable aspects related to autonomy were asked, such as how responsible they were when they wrote about anything important in their logbooks, if they surpassed obstacles by their own, among others.

Data Analysis

We chose to analyze the data selecting from Creswell's (2016) general data analysis strategies. More specifically, after data was gathered, we started by identifying codes, then reducing the codes to themes, identifying patterns, counting frequency of codes using Microsoft Excel, relating categories to reach conclusions, and finally, displaying and reporting the data through contrasts, comparisons, interview fragments, and graphs that display quantitative information.

Findings

After analyzing data, we identified two shifts in behaviors related to the students' autonomy. More specifically, the students' dependence on teachers, and the students' interest in their own learning process, the former having decreased through the school year, and the latter having increased. Last but not least, we also tried to analyze students' use of AI when working on their School Projects, but analysis rendered non conclusive due to sparse data. The following findings recount data analysis organized by three criteria: chronological order, in which the data was collected, subject from whom data was obtained, and data collection instrument.

It is worth mentioning: first, that the questionnaires with quantitative information were answered by students on a scale from 1 to 5, with 1 being *few* or *nothing*, and 5 *a lot*, and all questions were asked in Spanish. Second, that the qualitative data we obtained from interviews was translated to English by us. And finally, that, because both teachers had different answers based on their particular experiences with their students, they will be differentiated and referred to as Teacher 1 and Teacher 2.

Decrease in Students' Dependence on Teachers

Analysis of interviews showed that, from the beginning, one of the teachers had a shift in his opinion, as, at the beginning, he believed students were still somehow dependent, and by the end of the school year, he believed students had developed some strategies and aptitudes related to their autonomy. All of this, while the other teacher stayed straight with his opinion, being positive in the decreasing of students' dependence from the very start of the School Project. Conversely, at the start, some of the students considered they were not as dependent on teachers, but almost half of them still felt dependent, as data from questionnaires showed. This changed later, when students declared feeling less dependent. To finish, logbooks analysis was not conclusive to determine dependence changes, however logbooks' check list did evidence that students needed to be reminded about submission dates.

Around April, teachers had divided opinions about students' dependence. Teacher 1 stated that students were not so dependent, as he put it when questioned about the effects that the School Project had on students' academic performance during the first interview: "the way of preparing their presentations when they have to, of preparing their materials or samples, they are so dedicated and tremendous... You give them the tool, you put this table, and the kids play with what there is there"[1] (Teacher 1 First Interview, April 3rd, 2024).

Yet, Teacher 2 sustained that students were still very dependent on teachers, but that it was a process in which, with time, students would become more autonomous. As he stated, "in autonomy matters, we are still a little stuck, given that they still must be pushed. But (…) it is each

[1] La forma de preparar sus exposiciones cuando toca, de preparar sus materiales o muestras, son muy dedicados y tremendos... Tú les pones la herramienta, tú les pones esta mesa y los pelaos juegan con lo que hay ahí

time more noticeable... let's say, more autonomy, or more independence in the development of their works"[2] (Teacher 2 First Interview, April 3rd, 2024).

In a later interview, when asked about if students were able to respond for what they had to do in their project, with teachers' help, but without teachers being the center of the process, Teacher 1 affirmed that students could do what they had to, having teachers as helpers: "Of course that I believe in students' capacity to answer for what they are asked for... And that, obviously, they do it with teachers' support"[3] (Teacher 1 Second Interview, September 11th, 2024).

Meanwhile, Teacher 2 had changed his mind, explaining that students were no longer so dependent, but that it was still a process to be working on. As he explained, "as we advance in the research project and we create the conditions, students respond more and more to comply with their logbooks and to do (…) research. They search for tools (…), trying to respond to (…) their project"[4] (Teacher 2 Second Interview, September 10th, 2024).

Significantly, both teachers considered that one of the causes for students becoming less dependent on teachers was that they were able to choose the topic they wanted to research on in their School Project. As Teacher 2 put it: "I consider that the improvement in autonomy that is happening in students... First, that students are free to choose the topic they will learn. Second, that

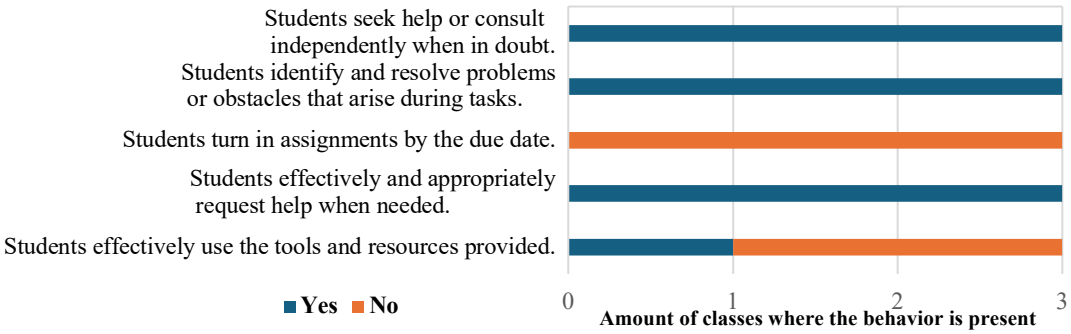
[2] En materia de autonomía, todavía estamos un poco quedados, puesto que todavía se les tiene que estar empujando, ayudando. Pero ya en el recorrido que vamos haciendo cada vez se nota más... digamos, más autonomía, o más independencia en el desarrollo de sus trabajos.
[3] Claro que creo en la capacidad de los estudiantes para responder por lo que se les pide... y que obviamente lo hagan con el apoyo de los profesores.
[4] En lo general, poco a poco, a medida que avanzamos en el proyecto de investigación y vamos creando las condiciones, los estudiantes van respondiendo cada vez más a cumplir con sus bitácoras y hacer las búsquedas que necesitan... van buscando herramientas para ir cada vez más, intentando responder a los planteamientos que tienen en su proyecto.

teachers here are mediators, while students oversee their own learning"[5] (Teacher 2 Second Interview, September 10th, 2024).

In another key point, data collected from logbooks check lists answered by Teacher 2 evidenced that, in September, students from the three classes were able to either identify and resolve problems that arose during tasks, seek help independently, or effectively and appropriately request help when they needed; however, only one class learned to effectively use the tools and resources provided, and none of the classes turned in their assignments on time. This does not necessarily mean that students were less autonomous while working, but simply that there were still some key elements that needed to be worked on.

Figure 1

Students' dependance on teachers by the end, according to Teacher 2



Note. Logbooks Checklist, September 23rd, 2024

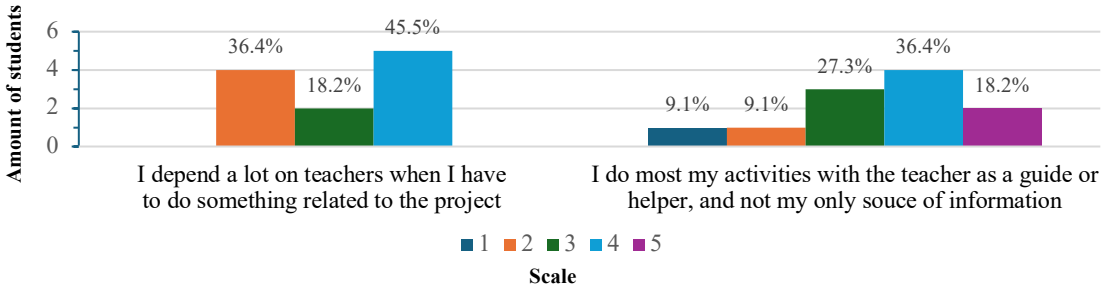
Now, regarding data obtained from students, around May, when students were establishing their research projects' question and objectives, the first questionnaire we performed showed that students had different opinions regarding their dependence on teachers, as more than 63% of them

[5] Considero que la mejora de la autonomía que se está dando en los estudiantes... primero que los estudiantes son libres de escoger el tema que van a aprender. En segundo, que los profesores son aquí mediadores, mientras que los estudiantes están encargados de su propio aprendizaje.

felt that they depended on them (answers rating between 3 and 4), while the other 36% believed that they were not as likely (answers rating 2). Similarly, around 55% of the students believed that they were doing most of their activities with their teacher being a guide and not as their only source of information (answers rating between 4 and 5). The following figure illustrates the data obtained.

Figure 2

Students' dependance on teachers at the beginning, according to students

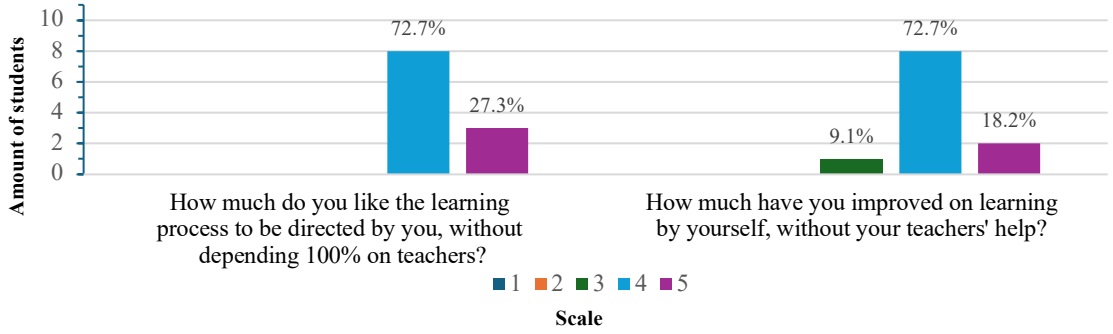


Note. Students First Questionnaire, May 26th, 2024

In September, when students almost had their project completed, the second questionnaire proved that they liked that their learning process was led by them, without depending always on teachers, and that they believed they got better at learning by themselves, without their teachers' help, ever since the school changed its pedagogical model. The following figure illustrates the data obtained.

Figure 3

Students' dependance on teachers by the end, according to students



Note. Students Second Questionnaire, September 20th, 2024

Improvement in Students' Interest in Their Learning Process

The data collected revealed that students' interest in their process had been significantly improved. First off, during the first months of the year, one teacher had negative thoughts about this topic, while the other spoke about the first positive effects that the School Project had on students' interest. However, by the second half of the year, both agreed that most of the students were interested in their projects and explained some of the reasons behind it. Second, it is noticeable that students had a constant interest in their project during the year, and it was seen in their responses to the questionnaires, in addition to their production in logbooks, which is observable when exploring the logbooks themselves and looking at the checklists.

To start, by the time of April, Teacher 1 had a negative view of students' interest. Taking a general look at students, he felt that not everyone was interested in the School Project, but they were doing it just because. As he expressed, "not everyone gets in the game, not everyone is doing

research even when it is a requirement. Not everyone takes real advantage of it, but they follow a blind step by step"[6] (Teacher 1 First Interview, April 3rd, 2024).

In contrast, Teacher 2 explained some of the effects the School Project had on students at an early stage of the year. As he stated:

> The most evident effects have been noticed in the interest for participating in a science fair, where students present their projects. And, well, the interest in attending real situations in the school environment. For example, improving situations like attendance, (...) the topic of garbage, (...) investigate in socials subjects that afflict them.[7] (Teacher 2 First Interview, April 3rd, 2024)

By the time of September, when students had their projects advanced and almost done, both teachers agreed that most of the students were interested in their process, and their projects. When talking about reasons for the increase in students' interest, Teacher 1 believed that Cooperative Learning was helping in this aspect, as he stated, "I think that that cooperative work, literally, favors, I think, in kids' disposition. Sometimes, somehow, it tends to fortify that interest"[8] (Teacher 1 Second Interview, September 11th, 2024).

Another reason in which both teachers coincided was students choosing their project's topic and looking for solutions. Teacher 1 claimed that:

---

[6] No todos se montan en la película, no todos están haciendo investigación a pesar de que es requisito. No todos le sacan el provecho real a eso, sino que siguen un paso a paso ciego.
[7] Los efectos más evidentes se han notado en el interés por participar de una feria de las ciencias, donde los estudiantes exponen sus proyectos. Eh, bueno, el interés por atender situaciones reales del entorno escolar. Por ejemplo, mejorar situaciones como la asistencia, (...) tema de basura, (...) indagar por temas sociales que los aquejan.
[8] Yo creo que ese trabajo cooperativo literal favorece tanto en el aspecto, me parece, de disposición de los pelaos, a veces de alguna manera tiende a fortalecer ese interés.

> Even if, sometimes, they take too long finding those close problems, and thinking in the possible solutions to those problems from hypothesis, at least, they should generate a commitment, right? And an interest in students, it would be used as a puller to that commitment and interest.[9] (Teacher 1 Second Interview, September 11th, 2024)

By the same token, Teacher 2 expressed that:

> Of course that dealing with problems from students' environments is going to make them stay committed to look for solutions. I believe that this happens because these are problems from their environment, and in the intention of looking for solutions, they will keep being tireless in that search, or to always remain aligned with their interest of getting solutions to the problems.[10] (Teacher 2 Second Interview, September 10th, 2024)

Now, regarding students, they seemed to be very interested in the School Project during the whole school year. By May, when the School Project was in the early stages, all the selected students were highly interested in their projects, and the first questionnaire proved it. When asked about if they participated in every stage of the project, around 54% answered 4 on the scale, while the rest answered 5. Also, the exact same percentages were obtained when students were asked if they worked voluntarily and in a good way.

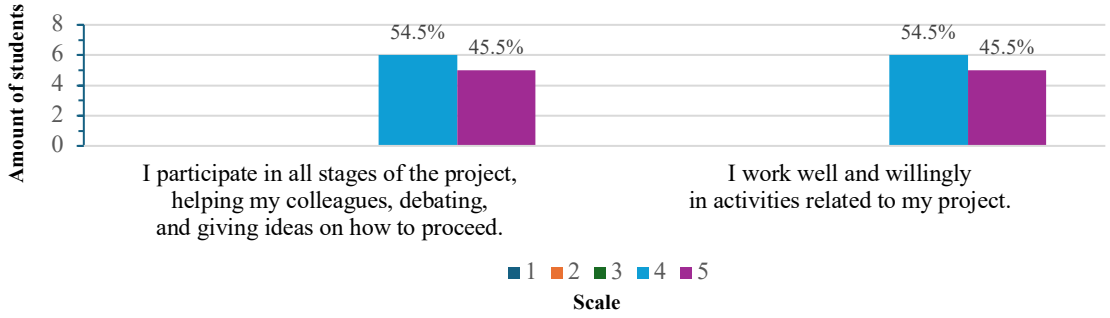
---

[9] Si bien, a veces se demoran mucho en encontrar esos problemas cercanos, y pues, pensar en las posibles soluciones a esos problemas desde las hipótesis, por lo menos, sí debería generar un compromiso, ¿cierto? Y un interés en los estudiantes. Se utilizaría como jalonador de ese compromiso y de ese interés.

[10] Desde luego que tratar problemas del entorno de los estudiantes va a hacer que ellos se mantengan más comprometidos en la búsqueda de soluciones. Creo que esto pasa porque son problemas de su entorno y en la intención de buscar soluciones, ellos van a seguir incansables en esa búsqueda o a mantenerse siempre alineados con su interés en conseguir soluciones a los problemas.

Figure 4

Students' interest at the beginning, according to students

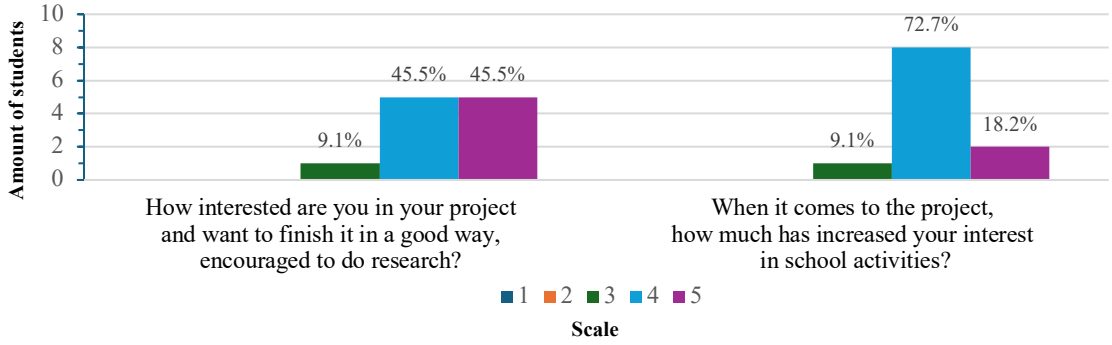


Note. Students First Questionnaire, May 26th, 2024

Then, by September, the second questionnaire revealed that students were still interested in their projects, as 91% of them answered in a very positive way when asked about how interested they were both in their school projects and in the completion of the task (responses between 4 and 5). Moreover, when asked about how much their interest increased related to project activities, around 73% of students answered with 4.

Figure 5

Students' interest by the end, according to students.



Note. Students Second Questionnaire, September 20th, 2024

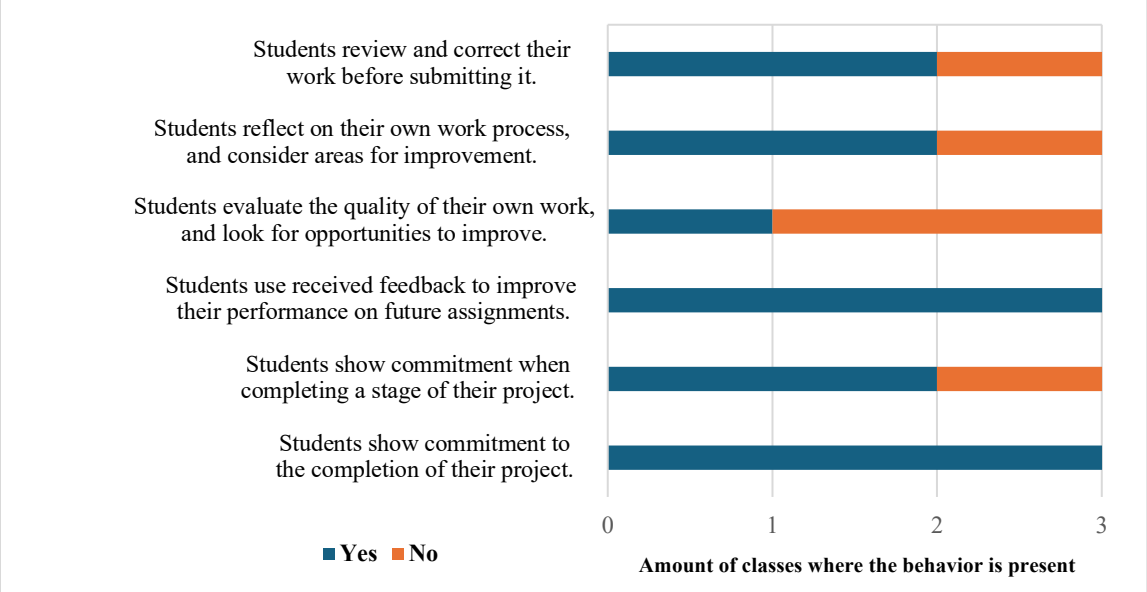
To finish, by September, students' production showed a lot of interest from them, which was evidenced by the logbooks. When analyzing students' work, it could be seen that students

were not doing something just to accomplish a task, but that they were genuinely interested in their projects: they decorated their logbooks, conserved them properly, and filled them with the needed information, and sometimes even more information than what was requested. (Click here to access logbooks photos).

This shift in behavior could also be seen when reviewing the checklist implemented in September, where Teacher 1 sustained that most of the students reviewed their work before submitting it, reflected on their own process, used feedback to improve their performance, and showed commitment in the stages of the project and its completion. The aspect related to interest that was seen at lower levels was that students were not actively looking for opportunities to improve on their work, although they did consider areas for improvement after receiving feedback, and most of them did review their work before submission.

Figure 6

Students' interest by the end, according to Teacher 2



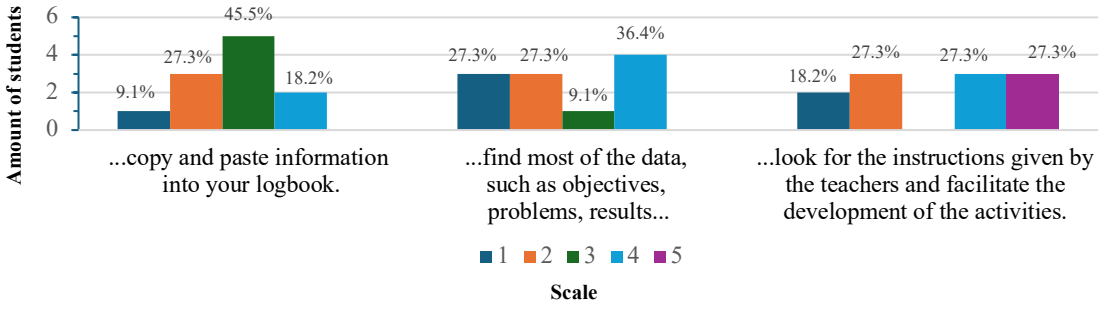
Note. Logbooks Checklist, September 23rd, 2024

Non-Conclusive Impact on the Use of Al in Students' Autonomy

Even though we were not looking for data related to this topic at the beginning of the data collection process, English class observations revealed the frequent use of AI as a common behavior among the students while developing the School Project. For this very reason, we did not collect data about the impact on the use of AI in the first interviews performed in April. Notwithstanding, we collected data from the students' first questionnaire, the teachers' second interview and the logbooks' checklist, to understand how students were making use of this tool. In this regard, the answers from students to the first questionnaire, back in May, showed that they themselves were ambiguous in this matter. Then, the teachers' second interview revealed that they believed that this topic was not relevant in terms of autonomy, as AI would not do the whole work for them. Finally, the checklist performed in September showed that teachers believed students were using tools and additional resources to support their work.

When analyzing students' first questionnaire, information obtained was so diverse that we could not identify a trend in behavior. To the matter of how much they used AI, such as ChatGPT or a translation tool, for the development of their School Projects, most students were neutral to using AI to copy and paste information in their logbooks. When asked about using AI to look for most of the information for their project, students had almost equally divided answers, going opposite ways. Similarly, students held different stances to using AI to copy the instructions given by their teachers and facilitate their work.

Figure 8



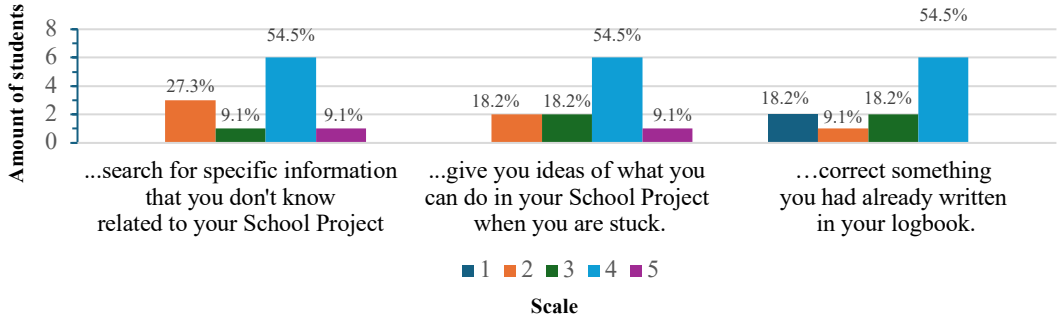
Student's use of AI at the beginning, according to students

Note. Students First Questionnaire, May 26th, 2024

However, there were some identifiable trends, like more than 50% of students having used AI to search for specific information that they did not know related to their school project, to get ideas regarding their project when they were stuck, and to correct something they already had in their logbooks.

Figure 9

Students' use of AI at the beginning, according to students



Note. Students First Questionnaire, May 26th, 2024

Once we got the chance to interview teachers on this matter, both teachers agreed that AI was a tool that students could use to help themselves, and that they should have learned to use, but none of them found a real relation between autonomy and AI, as Teacher 2 explained,

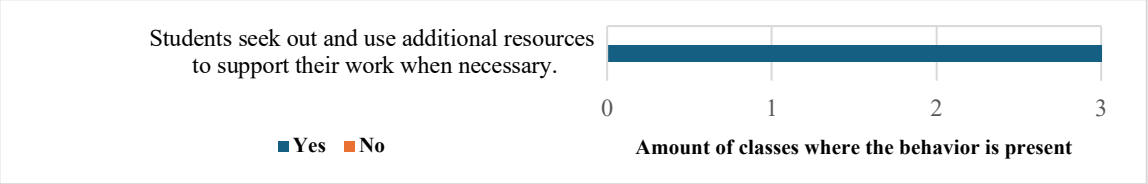
> Artificial intelligence (AI) must be a tool that students must learn to use... (...) Seeking for concrete answers to problems of their environment? I do not believe that AI solves that task for them. There, they have their very own choice. So, AI is not something determinant in this case.[11] (Teacher 2 Second Interview, September 10th, 2024)

And Teacher 1 complemented, "to crucify students that use AI and tell them that it is a bad thing, is going against the reality of the world. So, I think that it (the goal) is to take advantage of those AI tools"[12] (Teacher 1 Second Interview, September 11th, 2024).

Finally, the Checklist showed that teachers believed students looked for and used different resources to support their work in all three classes.

Figure 7

Students' use of AI by the end, according to Teacher 2



Note. Logbooks Checklist, September 23rd, 2024

[11] La inteligencia artificial debe ser una herramienta que los estudiantes deben aprender a manejar (...) ¿la búsqueda de respuestas concretas a los problemas de su entorno? No creo que la inteligencia artificial resuelva eso para ellos. Allí ellos tienen una decisión muy propia y es de ellos. Así que la inteligencia artificial no sea algo determinante en este caso.

[12] Crucificar a los estudiantes que utilizan las IA y decirles que eso está mal, pues también es ir en contra de la realidad y la vertiente del mundo. Entonces yo creo que es aprovechar esas herramientas de IA.

Discussion

Upon our arrival in the Avelino Saldarriaga school, *Investigación Escolar*, a distinctive pedagogical innovation strategy, was being implemented to change a traditional model. This way of teaching was built over Inquiry-based Learning, which is focused on a student-centered approach, an approach that needs a great deal of students' autonomy to be successful. That was the situation explored in this research project, and in which there were significant findings, like students becoming more independent from their teachers, students becoming more interested in their learning process, and the implications of AI in autonomy, which were not completely clear.

The main point in the decrease in students' dependence on teachers, actually was the independence given to them by a strategy centered on students, such as *Investigación Escolar.* To name a concept that fostered independence is a little hard, as Inquiry-Based Learning, Collaborative Learning, and Problem-Based Learning, are Student-Centered approaches, but there are some aspects that prevail. For example, the fact that students were able to choose their topic and work around a problem of their interest could have helped them investigate, use tools and advance on their own, without being coached by teachers.

In a similar manner, the increase in students' interest in their learning process could be related to students having the possibility to choose their research topic. Focusing on problems that were important and relatable to them could have helped students be more engaged in the development of their projects. More so, the pursuit of solutions to their chosen problems could have resulted in a bond between students and their work. Meanwhile, students working with each other, discussing ideas and finding things in common, would lead students to develop

relationships, which goes hand in hand with Laal and Ghodsi's (2012) theory about humans' need for interaction and communication.

Even though the analysis of how the use of AI is a pertinent topic nowadays, and we were able to gather data about students' use and teachers' opinions, results did not offer us a clear panorama on its relationship with autonomy development. It is worth highlighting here that AI use in education and, more specifically, in relation to autonomy was, at the time of this study, still understudied. Theory and research on AI's functioning and uses, along with its limitations in education, could shed light on the implications of such tools in a pedagogical innovation like the one we analyzed here.

Conclusions and Recommendations

In general terms, the concerns that led to the creation of this research project, which included the effects that Inquiry-Based Learning had on students' autonomy, were satisfactory addressed. Overall, the process was enjoyable. The school opened their doors for us to do our research and offered help when we needed; students and teachers did their best to help us when we needed data. We could say that being part of this community, at least for a while, understanding how the School Project was being developed, made us feel that we were doing something important.

In the path, we found many limitations. Some students changed groups or decided to work on their own at any moment of the school year, which changed the number of participants unexpectedly. Also, agreeing on a date and time to interview teachers was difficult, considering their tight schedules, their numerous duties at school and the limited time we had at school that

coincided with their availability. Aligned with that, one of the teachers sent the logbooks checklist when findings were already written.

Another important limitation that could have hindered data analysis regarding the use of AI was the fact that we did not have enough data to compare and triangulate, as we started to gather data on this topic after we had performed the first teachers' interviews. When we first started this study, AI was not something we wondered or were interested about, so we never even considered it in our data collection instruments. That changed when we saw students using it when working on their projects during English classes. Then, we started to collect data from both the students' and teachers' perspective, but the data was not enough for us to identify trends in behavior or derive conclusions.

The findings of this study have positive implications for the Avelino Saldarriaga school, as they will reassure teachers and administrators that implementing *Investigación Escolar* was the right choice, given that the School Project did help students gain autonomy in matters of independence from teachers and increasing student interest. However, validating they are on the right path is just a small part in the change the school intends to make. We believe further research must focus on a deeper integration of English classes into the School Project, given that during this study the English class only contributed to the translation of the contents of the project that the students had already written in Spanish. This should also be considered when replicating this study in other schools using *Investigación Escolar*. Also, more extensive research can be done to include a bigger sample of students, teachers and even administrators involved in the adoption of this pedagogical innovation to gather more compelling data that can better inform decisions in the future.

References

Altrichter, Posch, and Somekh (1993). *Teachers Investigate their Work: An Introduction to Action Research across the Professions, Second Edition. 10.4324/9781315811918.*

Amin, S., Utaya, S., Bachri, S., Sumarmi, & Susilo, S. (2020). Effect of Problem Based Learning on Critical Thinking Skill and Environmental Attitude. *Journal for the Education of Gifted Young Scientists, 8(2), 743–755*. https://doi.org/10.17478/JEGYS.650344

Creswell, J. W., & Poth, C. N. (2016). *Qualitative inquiry and research design: Choosing among five approaches.* Sage publications.

Gholam, A. P. (2019). Inquiry-based learning: Student teachers' challenges and perceptions. *Journal of Inquiry and Action in Education, 10(2), 6.*

I.E Avelino Saldarriaga (n.d.). *Historia de la Institución Educativa Avelino Saldarriaga*. Retrieved October 18, 2023, from https://www.ieavelinosaldarriaga.edu.co/index2.php?id=22829&idmenutipo=1377.

I.E Avelino Saldarriaga (2022). *Plan de Área Inglés*. https://www.ieavelinosaldarriaga.edu.co/index2.php?id=158344&idmenutipo=9906

Laal, M., & Ghodsi, S. (2012). Benefits of Collaborative Learning. *Procedia—Social and Behavioral Sciences, 31, 486-490.* https://doi.org/10.1016/j.sbspro.2011.12.091

Manen, M.V. (2003) *Investigación Educativa y Experiencia Vivida: Ciencia Humana para una pedagogía de la acción y La Sensibilidad*. Barcelona: Idea Books.

Pedaste, M., Mäeots, M., Siiman, L., De Jong, T., Van Riesen, S. a. N., Kamp, E. T., Manoli, C. C., Zacharia, Z. C., & Tsourlidaki, E. (2015). Phases of inquiry-based learning: Definitions and the inquiry cycle. *Educational Research Review, 14, 47–61.* https://doi.org/10.1016/j.edurev.2015.02.003

Proyecto Educativo Institucional, PEI (2023). Institución Educativa Avelino Saldarriaga.

Qureshi, M., Khaskheli, A., Qureshi, J., Raza, S., & Yousufi, S. (2021). Factors affecting students' learning performance through collaborative learning and engagement. *Interactive Learning Environments, 31, 2371 - 2391.*

Ramamuruthy, V., & Rao, S. (2015). Smartphones promote autonomous learning in ESL classrooms. *Malaysian Online Journal of Educational Technology*, 3(4), 23-35.

Reinders, H., & Balcikanli, C. (2011). Learning to foster autonomy: The role of teacher education materials. *Studies in Self-Access Learning Journal,* 2(1), 15-25. http://sisaljournal.org/archives/mar11/reinders_balcikalni

Salehi (2016). *Different Data Collection Methods in Qualitative Research.* https://matinsalehi.wordpress.com/2016/04/27/different-data-collection-methods-in-qualitative-research/

Schwartz, P., Mennin, S., Webb, G. (2001). *Problem-Based Learning: Case Studies, Experience and Practice. Case Studies of Teaching in Higher Education*.

Setlight, K., Betaubun, M., & Kartika, V. (2023). Involving Problem-Based Learning as an Alternative for EFL Students' Writing Improvement: A Method for Teaching Writing. *Journal of English Culture, Language, Literature and Education, 11(2), 210-235.* https://doi.org/10.53682/eclue.v11i2.6625

Sumarmi, Bachri, S., Baidowi, A., & Aliman, M. (2020). Problem-Based Service Learning's Effect on Environmental Concern and Ability to Write Scientific Papers. *International Journal of Instruction, 13(4), 161–176.* https://doi.org/10.29333/iji.2020.13411a

Thanasoulas, D. (2000). What is Learner Autonomy and How Can It Be Fostered. *The Internet TESL Journal, 6(11).* http://iteslj.org/Articles/Thanasoulas-Autonomy.html

Wijaya, K. (2021). Collaborative and Problem-Based Learning in Promoting Indonesian EFL Learners' Learning Autonomy. *Polyglot: Jurnal Ilmiah. 17. 191-211.*

Yin, R. K. (2003). Case study research: design and methods. *3rd ed. Thousand Oaks, Calif., Sage Publications.*