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Artículos científicos

Estudio de caso del aprendizaje basado en proyectos desde los actores de nivel primaria

Case study of project-based learning from primary level actors

*Estudo de caso de aprendizagem baseada em projetos de atores de nível
primário*

María Obdulia González-Fernández

Universidad de Guadalajara, México

ogonzalez@cualtos.udg.mx

<https://orcid.org/0000-0001-5890-7666>

Laura Becerra Vázquez

Universidad Pedagógica Nacional UPN 142, México

laurabecerravazquez498@gmail.com

<http://orcid.org/0000-0003-0832-749X>

Resumen

Este trabajo presenta los resultados de una investigación cualitativa con la finalidad de caracterizar los desafíos de la metodología de aprendizaje basado en problemas (ABP) en una institución privada de educación básica en México. El estudio se desarrolló a partir de 15 entrevistas realizadas a directivos, docentes y alumnos. Se utilizó el análisis de contenido para la sistematización de los datos. Los códigos principales fueron *percepción del aprendizaje, limitaciones, sugerencias, ventajas y ambiente de aprendizaje*. Los resultados demuestran que la metodología de aprendizaje basado en proyectos promueve el pensamiento crítico, la creatividad y la autonomía. Como uno de los desafíos se encuentran los paradigmas tradicionales, el conformismo y el desconocimiento de la estrategia por parte de los docentes. En específico, los resultados de las entrevistas a estudiantes demuestran que no cuentan con las habilidades para el manejo de la información al momento de generar los proyectos; además, necesitan reforzar las habilidades para la coordinación del trabajo en el interior de un equipo. Se destaca la importancia del generar ambientes de colaboración, para lo cual la temática o pregunta del proyecto debe ser motivadora para el estudiante y, por último, promover en todo momento una actitud activa frente el aprendizaje. Estos resultados permiten conocer una



parte de la integración en el nivel básico del ABP, por lo que ayuda a impulsar su integración en las diferentes comunidades educativas, no solo de forma enunciativa, sino práctica.

Por último, como limitantes del estudio se identifica el carácter metodológico, por lo que para futuras indagaciones de este tipo se puede aumentar la muestra, lo que permitirá conocer la realidad de aplicar dicha metodología en otras instituciones.

Palabras clave: aprendizaje activo, aprendizaje basado en proyectos, innovación educativa, método de enseñanza, modelo educativo, nivel primario.

Abstract

This paper presents the results of a qualitative research in order to characterize the challenges of the Problem-Based Learning (PBL) methodology in a private institution of basic education in Mexico. The study is qualitative in nature, based on 15 interviews with managers, teachers and students. Content analysis was used to systematize the data. The main codes were: Perception of learning, limitations, suggestions, advantages and learning environment.

The results show that the project-based learning methodology mainly promotes critical thinking, creativity and autonomy. As one of the challenges is the traditional paradigms, conformity and ignorance on the part of teachers. Specifically, the results of the interviews with student's state that they do not have the skills to manage information at the time of generating the projects, in addition to the fact that it is necessary to reinforce the skills for the coordination of work within a team. The importance of generating collaborative environments is highlighted, that the theme or question of the project is motivating for the student and finally, promoting an active attitude towards learning at all times. These results allow us to know one face of integration at the basic level of PBL, thus helping to promote its integration in the different educational communities, not only in an enunciative but also in a practical way. Finally, as limitations of the study, the methodological nature is identified, so that for future studies of this type the sample can be increased that allows knowing the situation of the application of said methodology in other institutions.

Keywords: activity learning, project-based learning, educational innovations, teaching methods, educational models, elementary education.

Resumo

Este artigo apresenta os resultados de uma pesquisa qualitativa com o objetivo de caracterizar os desafios da metodologia de aprendizagem baseada em problemas (PBL) em uma instituição privada de educação básica no México. O estudo foi desenvolvido a partir de 15 entrevistas com gestores, professores e alunos. A análise de conteúdo foi utilizada para sistematizar os dados. Os principais códigos foram percepção de aprendizagem, limitações, sugestões, vantagens e ambiente de aprendizagem. Os resultados mostram que a metodologia de aprendizagem baseada em projetos promove o pensamento crítico, a criatividade e a autonomia. Como um dos desafios estão os paradigmas tradicionais, o conformismo e o desconhecimento da estratégia por parte dos professores. Especificamente, os resultados das entrevistas com os alunos mostram que eles não possuem habilidades para lidar com as informações na hora de gerar os projetos; além disso, eles precisam reforçar as habilidades para coordenar o trabalho em uma equipe. Destaca-se a importância de gerar ambientes colaborativos, para os quais o tema ou questão do projeto deve ser motivador para o aluno e, por fim, promover uma atitude ativa em relação à aprendizagem em todos os momentos. Esses resultados nos permitem conhecer um pouco da integração no nível básico do PBL, ajudando assim a promover sua integração nas diferentes comunidades educacionais, não só de forma enunciativa, mas também na prática.

Por fim, como limitações do estudo, identifica-se a natureza metodológica, de modo que para futuras investigações deste tipo a amostra possa ser ampliada, o que permitirá conhecer a realidade de aplicação desta metodologia em outras instituições.

Palavras-chave: aprendizagem ativa, aprendizagem baseada em projetos, inovação educacional, método de ensino, modelo educacional, nível primário.

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Introduction

Education in the 21st century must adapt to current scenarios and new ways of learning from students, who demand teaching methods based on active pedagogical models. According to García Pérez (2000), renewing the educational reality starts from a deep reflection from its desirable didactic model, as well as from the organization and real dynamics of educational centers. Thus, the didactic models that focus their attention on mechanisms to favor the construction of knowledge from projects and problems stand out.

For this reason, since the beginning of the 21st century, efforts have been made to restructure the curricula of the Mexican educational system through constructivist pedagogical approaches and by competencies. This is in accordance with the proposals of authors such as Aguerrondo (1999), Díaz Barriga (2006), De la Torre (2008), Ortiz (2011) and Larrañaga (2012), who propose the need for a profound transformation in the models educational due to the characteristics and needs of today's society, where information and the use of new information and communication technologies (ICT) abound.

In this framework of transformations, one solution is the application of active pedagogies that promote constructivist activities in favor of learning. These methods are not unknown, since authors such as Dewey (1995) and Kilpatrick (1918) proposed that education should start from the experiences and interests of students to plan educational activities.

According to Morales and Landa (2004), learning-centered teaching assumes an active role, with greater commitment and responsibility on the part of the learner, what Prieto (2006) calls active learning, which differs from methodologies where learning it is conceived passively. That is, you cannot learn by just listening to the teachers, memorizing the contents, writing about them and answering the questions. In such a way that activities focused on learning are characterized by respecting the potentialities and singularities of students (SEP, 2011), as well as their learning styles, which can be enhanced with collaborative work (Silberman, 2006), to what Díaz Barriga (2006) calls adaptive and cooperative strategies. These are distinguished by being varied, contextualized in different settings, and by favoring the understanding of concepts more than memorization (Wesley y Richard, 2004).

McAlpine (2004) states that the design of a teaching focused on active learning consists of an ideal sequence of four steps: involvement, information, practice and evaluation. The various methodologies focused on these principles share common features such as the following: they are based on contextualized studies, they are inductive, they are based on research to answer questions, and the transfer of knowledge is promoted in different contexts. The role of the teacher is to be a learning facilitator and it is possible to work in heterogeneous groups in favor of cooperative learning where, in short, some action that the student plans according to the environment is promoted (Sanmartí y Márquez, 2017).

Project-based learning

One way to carry out active methods is through project-based learning (PBL) or project-based learning (PBL), which benefits the student's active work and collaborative work from of the negotiation of the participants (García-Varcácel, Muñoz-Repiso and Gómez-Pablos, 2017). Araújo and Sastre (2018) state that this methodology is emerging as one of the innovative approaches in current academic training. Perrenoud (1999) and Trujillo (2015) recognize it as one of the active methodologies, since from its phases "the project" is the backbone of a pedagogy for the construction of knowledge in a class. Its objectives are focused on managing to mobilize knowledge or procedures in favor of the construction of competences, in addition to increasing the sense of knowledge and school learning or, failing that, describing new knowledge, perspectives and promoting motivation within the framework of the project based on cooperation between colleagues.

Project-based learning fosters a way of working that favors research, based on various questions posed to students, which they must try to solve by searching for information from various sources. In this way, the investigation of a reality is favored by mobilizing concepts when confronting information (Martín and Rodríguez, 2015).

These strategies have now gained greater strength as a result of the competency models promoted by the world educational systems that seek for the student to develop the skills and attitudes to perform a task. In this context, the project is associated with any productive action that requires the articulation of activities to generate products, solve problems or satisfy needs and concerns, considering the resources and the time allocated. According to Díaz Barriga (2006), in conducting a project, students participate in a productive and collaborative way in favor of the construction of knowledge in an innovative way. In the project-based methodology, the student makes a resignification of the teaching-learning process, since it allows to create dynamics of cooperation that confront the student with situations that lead him to propose proposals in a certain situation.

The characteristic of PBL is the construction of knowledge based on the globality of the project, the need for research in different sources, collaborative work, the union between reality and the contents worked on in school, as well as the relationships between students-students, student-teacher, family and environment, which increases motivation (Barba-Marín, Sonlleve-Velasco and García-Marín, 2018).

The PBL, as a didactic methodology, is a guide to the development of a sequence of activities in favor of learning, and as an academic-curricular model it becomes the transversal axis of the development of competences in a set of subjects. This groups a set of pedagogical techniques that the teacher must implement to achieve a specific product.

According to Bender (2014), the PBL must generate the use of authentic and realistic projects, based on a highly motivating and involving question, task or problem linked to the context of the profession. This model has its roots in constructivism, which evolved from the work of psychologists and educators such as Dewey (1995), Piaget (1977) or Vygotsky (1962). Its successful implementation requires a systematic process that according to Cobo and Valdivia (2017) should be developed in five stages:

1. **Project approach and organization:** In this step the teacher proposes a topic that is closest to the reality of the student so that it encourages learning and the development of learning objectives. He can pose generated questions that guide the generation of ideas. To continue with the definition of the final product or challenge and its evaluation criteria, later the teacher organizes the collaborative work.
2. **Research:** The student is given autonomy to search for information and analyze it to develop the project's product. The role of the teacher is to guide students in searches and provide tools to reach a deep analysis that allows the assimilation of information. Then, synthesis tasks are encouraged for students to generate hypotheses that provide answers to the initial question.
3. **Definition of the objectives and work plan:** The project aims to develop a product, service or experience; For this reason, it is necessary for students to define their objective according to the theme or the generating questions, and to develop a planning based on a set of tasks assigned to each of the members of the project.
4. **Implementation:** In this stage, students apply what they have learned during the research, analysis and synthesis phase to produce a product that answers the initial question.
5. **Socialize the product and evaluation:** The students present the results of each of their products before their classmates or an audience defined by the teacher. To end the evaluation, it is necessary for the teacher to recover what they have learned from a collective reflection that allows to reaffirm the learning learned and explain the experience of the project.

This last step can be carried out from mechanisms of co-evaluation, self-evaluation and hetero-evaluation so that students and teachers close the project with metacognitive processes of the experience. Therefore, it is important to have tools such as rubrics and checklists.

The active role of both the teacher and the student is present in each of the stages of the project's development, so it is recommended that it be framed by the reference

approaches of the subjects involved and that the teacher be accompanied during the entire project process.

There are many advantages that this model offers to the learning process, since it encourages students to think and act based on the design of a project, developing a plan with defined strategies to provide a solution to a question by encouraging the inquiry into the students. By working with projects, students explore and discover their interests, share their ideas and share information (García-Varcácel et al., 2017). Therefore, it allows learning in diversity by working together, stimulates emotional, intellectual and personal growth through direct experiences with people and students located in different contexts.

Ultimately, students learn different techniques for solving problems by being in contact with people from different cultures and with different points of view; in other words, they learn to learn from each other and they also learn how to help their peers learn. They also learn to evaluate the work of their peers and to give constructive feedback for both themselves and their peers. Active methodologies such as project-based learning promote teamwork, where the student is the protagonist, usually developing a joint product to achieve a common goal (Rodríguez, Vargas & Luna, 2010). The role of the teacher is to be a guide, orient the work and promote relationships between the team's actors (Fernández et al., 2018). Therefore, the process of developing a project encourages students to experiment, engage in discovery-based learning, learn from their mistakes, and face and overcome difficult and unexpected challenges.

Experience in Mexico of the project-based model

As already mentioned, the specific case of ABP is not a new proposal, since the Ministry of Public Education (SEP), in the nineties, already proposed constructivist principles in the specific case of the Plan 92 Preschool Education program, which it bases the conditions and organization of work at said educational level. This program proposes the methodology by projects under the globalizing principle of a flexible pedagogical perspective. In this way, the didactic organization and the organization of games and activities are proposed around a generating question, a problem or a specific activity to be carried out (SEP, 1992). This methodology led teachers to change their teaching practice, which in some cases was made difficult by the novelty of the paradigm. According to Quiroz Lima (2002), some of the difficulties were:

- Educator: Regarding the planning of the project in time, since the duration of the project allowed the educational objective to be dispersed. In addition, there was little clarity on how to integrate the content with project work, as well as the methodology and the principles that governed it.

- Parents: Lack of support by not being willing to help children with the time, materials and activities required.
- Children: Problem of unification and continuity of group interest on a chosen aspect.
- Infrastructure and logistics: The kindergartens did not have the amount of materials to carry out the project; in addition, in large groups, control over a group project was inoperative.

In the preschool education program 2004, the term project methodology was included as one of the various methodological options for the development of competencies. Furthermore, the different experiences of project-based learning at the various levels highlight the benefits of integrative, globalizing, active and collaborative work. However, according to Bender (2014), this methodology is also complicated, since it requires perseverance, dedication and efforts on the part of the educational community. As for students, it is necessary to promote self-learning skills, active work, research skills, as well as a commitment to collaborative work.

For all the above, this work gives an account of the experiences obtained when applying this educational model in a private basic education institution. In this regard, it should be mentioned that not all private educational centers are governed by constructivist principles to promote meaningful learning. For this reason, the fact that the institution has as a transversal axis of its educational model the development of projects generates different challenges for basic education. In this sense, the 2017 educational model of the SEP states that one of its main objectives is for teachers to build educational environments that promote meaningful, creative and innovative interactions to achieve the objectives in conditions of equity (SEP, 2017), hence suggest the use of methodologies such as PBL.

Methodology

The objective of this research was to characterize the different experiences of the teaching-learning process in the innovative framework of the project-based learning (PBL) methodology. With this, an attempt was made to detect the benefits of said methodology and the areas of opportunity to establish new lines of research that help teachers to improve their teaching practice. For this, a qualitative interpretive study was developed, which allows investigating situations in their natural environment to try to interpret the phenomena (Durán, 2012).

The case study was used as a technique, since the research is circumscribed in a specific context of a given educational institution. According to Muñiz (2010), the case

study considers the selection of a qualitative sample to study a specific phenomenon or event, so its selection depends on what is to be analyzed. In other words, the case study is an empirical investigation that studies a phenomenon within its real context, so it focuses on the description and comprehensive and systematic examination of the event. (Durán, 2012).

Population

The school community where the research was carried out is a private institution incorporated into the Ministry of Public Education at the primary level. It is recently created and has a 7-hour morning school schedule. It is characterized by belonging to a medium, medium-high and high socioeconomic level. The educational community has 225 students at the primary level, 11 group teachers and 12 teachers of complementary classes. As an educational center, it stands out for being the apex of education in the Altos region of the state of Jalisco (Mexico), a pioneer in the implementation of this methodology to try to respond to the needs of the future.

Instrument

A semi-structured interview was developed based on the categories of experience of the PBL, challenges of the application of the PBL and benefits of the PBL. The instrument was applied to six teachers, eight students, and a campus manager. The interviews were conducted during 2019, in the 2018-2019 school year, through audio recordings that had the authorization of the institution's management.

Data analysis technique

To carry out the systematization of the data, the content analysis technique was used through the inductive coding of codes to which labels were assigned that indicated the category of a topic or idea. This technique serves to interpret writings and audios that make sense and can be captured within a context. In other words, valid and reliable inferences can be made from data regarding a context where messages acquire meanings (Andréu, 2001). The analysis work followed the following steps:

- Determine the object of analysis (the implementation of project-based learning).
- Establish coding rules (based on the interview questions).
- Develop an inductive category system.
- Coding, which is the assignment of codes to each category, classifying the material for the construction of a code system.



- Generate inferences from an inventory in which the units of meaning are isolated, conforming the empirical content of the categories.

For said analysis, the MAXQDA program, version 2018 (software for qualitative data analysis) was used, in which the list of codes and segments is generated. Also, labels were assigned to indicate that they are examples of some thematic idea.

Results

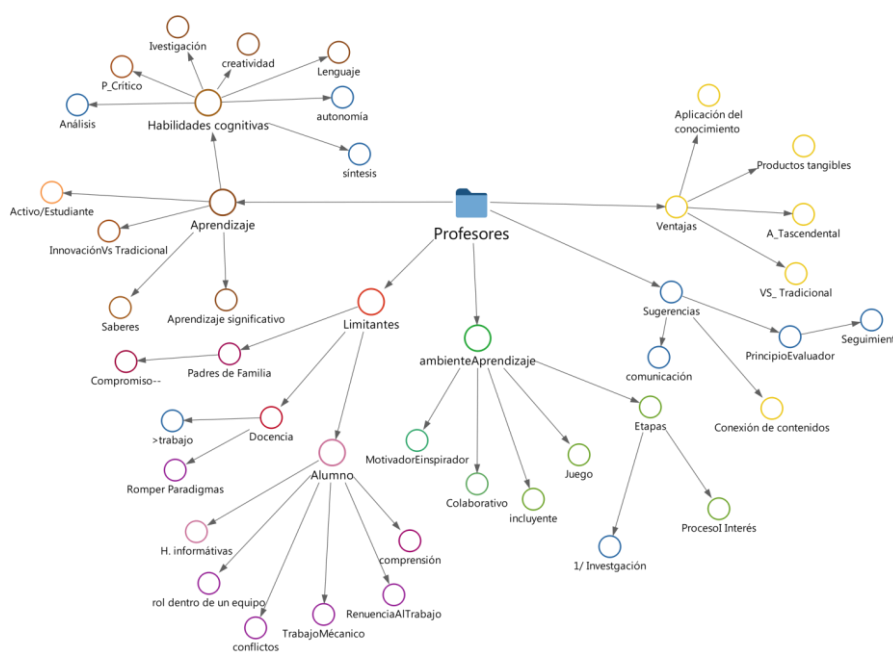
To perform the content analysis, the codes were classified into five categories: advantages, limitations, learning environment, learning and suggestions. In total, 80 codings were registered, distributed as follows: 8 corresponding to the interview with the manager, 24 distributed in the interviews with the students and 48 corresponding to the interviews with the teachers.

Meanings of PBL from the teaching perspective

The results of the interviews with the teachers showed in the learning category that they consider that learning by project enhances creativity, autonomy and critical thinking. In the advantages category, it was found that the application of knowledge is one of the great benefits of this form of work. At the same time, it is highlighted that the methodology generates a collaborative work environment in groups. This is how an interviewee narrates it:

The moment that most encourages teamwork is the moment of interaction through comments because you add your opinion regarding the content of the colleague and others begin to comment through this (entrevistada 5, maestro, 2019).

Figura 1. Modelo de un caso de la codificación de entrevistas a docentes



Fuente: Elaboración propia

Figure 1 shows the synthesis of the analysis of the results (the size of the circles of each of the codes and sub-codes shows the frequency of the codings). Teachers consider that the advantages of PBL is that it develops creativity, critical thinking and research skills. An example of this is the following interview fragment:

It makes students generate critical thinking and at the same time meaningful learning (...). In young children, it develops creativity, the ingenuity of the child (interview 6, teacher, 2019, 1-1: 36).

Some young people come to reason and achieve a goal in the project, others not because they do it mechanically, because it is slower in some than in others, but a good number of them manage to reason and take advantage of the project (entrevista 3, maestro, 2019, 42-1:50).

However, teamwork is recognized as a challenge, as the following teacher narrates:

The challenges are if you work as a team that the student manages to play the role that he plays for the team, being tolerant, accepting the opinions of others and individually that they can acquire the information for the project (entrevista 1, maestro, 2019).

The limitations were the commitment of the parents and their involvement in the work, in addition to the lack of information skills for the search and processing of information in the initial stage, as well as the reluctance to work on the part of the students. An interviewee stated this as follows: “I observe that the student gets lost in the information and loses the objective and may be frustrated” (interviewee 1, teacher, 2019).

In summary, teachers consider PBL as beneficial for student learning, since it encourages the development of skills and breaks traditional schemes to move towards constructivist models. However, there are also limitations associated with increased planning and evaluation work. It is therefore necessary to break educational paradigms both in parents and in the students themselves.

The student's vision before the ABP

The interview carried out with the students shows that they perceive more learning with PBL than with traditional methods. In turn, they consider that the methodology allows developing knowledge in the midst of a more fun and pleasant environment, which becomes inspiring. Regarding the limitations of the methodology, they point out conflicts in teamwork. These results can be seen in Figure 2, where the categories are classified according to the hierarchy of codes (as already mentioned, the size of the circle indicates the frequency of the codings).

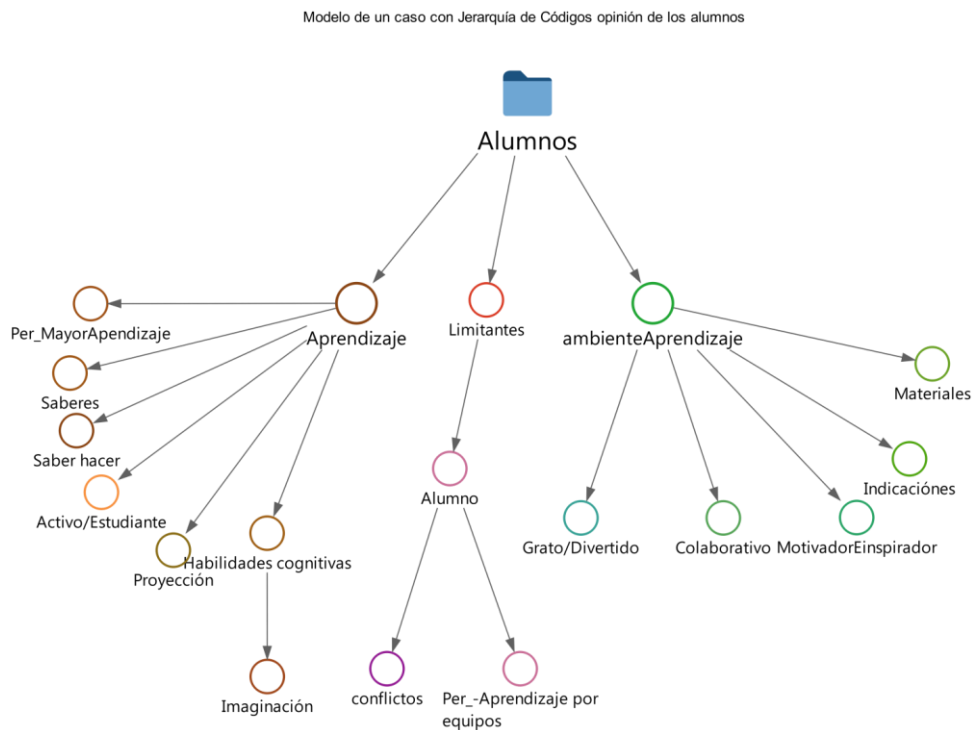
When interviewing the students, it was found that cooperative and team work draws their attention:

The differences between my previous school and this one is that you did not have teamwork and we were only individual, and the teacher would make us do that and explain to us and now she lets us do it alone (entrevista 1, alumno, 2019).

When asking about the experiences they have had in carrying out projects, a student commented that there are conflicts, but then solutions must be reached: "Well, many conflicts, but in the end we have to resolve them to get back together again" (interview 2, student, 2019).

Likewise, the recognition of the development of imagination stands out: "In projects it is not just writing, but you can use your imagination" (entrevistada 3, alumno, 2019).

Figura 2. Modelo de un caso con jerarquía de códigos de entrevistas a alumnos



Fuente: Elaboración propia

In short, the student perceives that working through projects encourages greater learning, since knowledge is put into practice that makes the task of learning more active, fun and motivating. However, the drawbacks of this type of collaborative work are the group conflicts that can arise.

The vision of the ABP leadership

Figure 3 shows the system of codes and subcodes that arose from the interview of a director of the institution. These results demonstrate the authorities' commitment to promoting an innovative education that develops cognitive skills in students. However, among the main challenges that the authorities have had to face, we can mention the conformity to traditional methodologies and the lack of understanding of the methodology by teachers, parents and students.

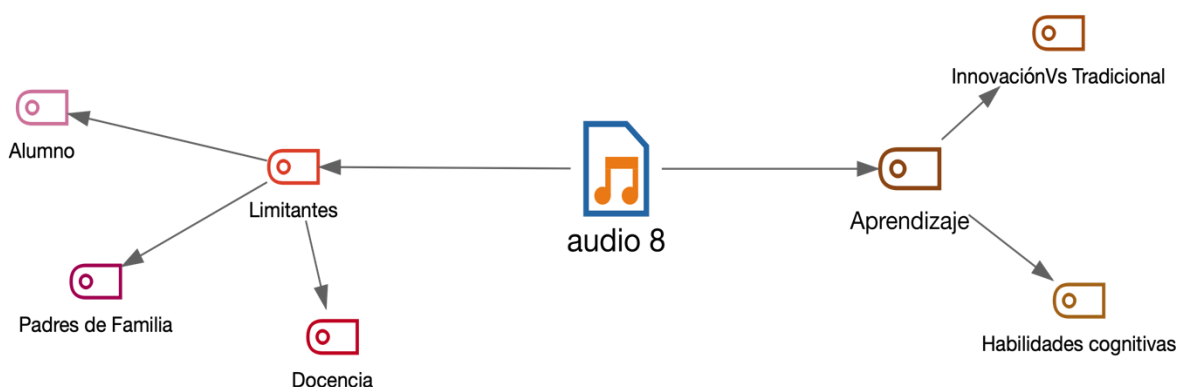
In this regard, the director pointed out how the idea of including project-based learning as a transversal axis arose:

The idea was because we wanted to transform education in the Highlands of Jalisco; here in the Tepatlán area there was a pure traditional method ... that's why we started to generate this type of constructivist education in order to obtain meaningful learning (entrevista 1, directivo, 2019, 1-17).

Also, in terms of challenges, mention the following:

It takes a lot of work for teachers to understand the change in conformism, I can call it that, since the method had always been the same ... Teachers have followed that line especially with experienced teachers, that culture clash, with new teachers not so much so that it has been achieved ... I have faced problems such as that teachers come to implement and understand meaningful learning since the student learns to develop it and that the parent understands how the methodology is (entrevista 1, directivo, 2019, 56-356).

Figura 3. Modelo de jerarquía de códigos de entrevista a directivo del plantel

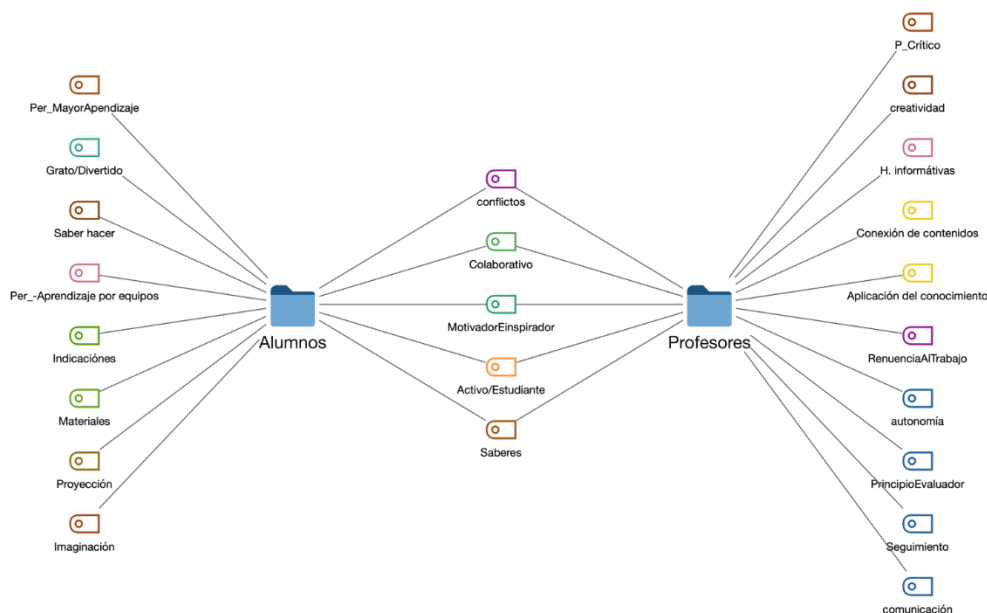


Fuente: Elaboración propia

In summary, the manager perceives project work as an innovative strategy, although with limitations that prevent breaking with traditional educational schemes implanted in teachers, students and parents. Even so, it is recognized that implementing this methodology in a transversal way in the primary education program has fostered the development of cognitive skills in students, which is why it is gradually being consolidated.

Finally, a comparison was made between the opinions of teachers and students to determine areas for improvement (eg, learning to work in a team), as well as their benefits (eg, motivating and inspiring method that promotes the development of knowledge), (figure 4).

Figura 4. Modelo de contraste de casos entre entrevistas a docentes y estudiantes



Fuente: Elaboración propia

The coincidences between the perception of teachers and students are found in the favorable collaborative work of the methodology, as well as in its motivating and inspiring capacity. In addition, the participants indicate that the strategy favors the active learning of the student and the construction of her knowledge.

However, it should also be noted that students perceive that materials are sometimes required to develop the activities, while teachers point out that the strategy requires more commitment and time than the traditional method, as well as better principles of evaluation and monitoring.

Discussion

The results of the study allow characterizing the benefits and challenges of project-based learning. In this sense, and as benefits, it is recognized that said methodology generates a motivating, collaborative, inclusive and playful learning environment. The same ones that agree with These results agree with Dvorak (2012) who in his thesis showed that the use of the methodology by projects increased the self-reported motivation of the participants mainly in the constructs: self-efficacy, intrinsic motivation and group work as a positive experience.

Another advantage has to do with the way in which the methodology encourages the application of knowledge and the generation of tangible products. In fact, this strategy develops imagination, creativity, autonomy, autonomous work and critical thinking.

These results agree with the statements of Muñoz and Díaz (2009), who mention that project work favors cooperation and helps to resolve conflicts based on the development of negotiation skills, reflection, joint decision-making, autonomy, etc. From

the qualitative results we can infer the benefits of project-based learning as expressed by Palomares, (2017).

On the other hand, as challenges, it was detected in the coding of teachers and managers that work must still be done to break with the traditional paradigm. This is a vital element that must be taken into account because it also indicates that in many cases the students come from institutions where passive methods predominate, so that for them it could also constitute an emotional and cognitive shock to have to face this new methodology. In this regard, Muñoz and Maldonado (2011) explain that students are usually more accustomed to traditional systems that are easier to assimilate, but that ultimately do not promote significant learning.

The challenge, therefore, consists of breaking existing paradigms, which implies teacher training in the use of active learning models. To do this, however, as Rekalde and García (2015) point out, the teacher's feeling of insecurity must first be fought, which originates from the lack of knowledge of the methodology, as well as their fear of being wrong. Paraphrasing Díaz Barriga (2006) and Molina (2019), the project-based methodology faces challenges related to the initial and continuous training of teachers.

Conclusions

The project-based methodology is a useful and integrative strategy that allows the student to be active at all times of the learning process. For its application, however, a great commitment is required on the part of the teacher and the educational authorities to optimally promote the learning objectives, which have to do with the ability to generate interest in students so that they can achieve a significant learning. Therefore, some benefits detected in this work on the ABP methodology are the following:

It is a methodology that breaks with the traditional model, as it requires students to get involved in all phases of the project. In short, it is a dynamic way of combining knowledge with know-how. In addition, it serves to promote collaborative and active work, which translates into greater learning from the student's vision.

The ABP allows to integrate learning in a transversal way, which is why the teaching organization demands to create projects that stimulate the students' knowledge. This allows the development of creativity, critical thinking, and task and time management, which ultimately generates autonomy in learning.

On the other hand, this work also revealed a set of areas for improvement regarding the use of said methodology, such as:

Breaking with the paradigms of traditional teaching in an educational community. This will be possible by strengthening a proactive and committed attitude among

authorities, educators, students and parents. Since in some cases students and teachers are accustomed to traditional strategies, so they are reluctant to develop activities that involve a change in the work scheme.

Another challenge is teacher training, since it is important that it is updated in the face of the use of active methodologies, which allows students to be involved in activities in favor of the construction of permanent and meaningful learning. In addition, adequate training to integrate various materials such as the use of information and communication technologies (ICT) that allows collaborative and self-managed work by the student, so they are tools that can be integrated into the learning methodology project-based.

Finally, it must be said that one of the main limitations of the study is that a reduced sample of subjects was considered, so the results cannot be generalized for most educational institutions. For future studies, therefore, the sample can be increased to establish similarities and differences not only between institutions, but also between educational levels.

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Rol de Contribución	Autor (es)
Conceptualización	María Obdulia González Fernández Laura Becerra Vázquez Grado de contribución: igual
Metodología	María Obdulia González Fernández.
Software	No aplica
Validación	María Obdulia González Fernández
Análisis Formal	María Obdulia González Fernández
Investigación	Laura Becerra Vázquez
Recursos	Laura Becerra Vázquez (Apoyo) María Obdulia González Fernández (Principal)
Curación de datos	Laura Becerra Vázquez María Obdulia González Fernández Grado de contribución: igual
Escritura - Preparación del borrador original	Laura Becerra Vázquez (Apoyo) María Obdulia González Fernández (Principal)
Escritura - Revisión y edición	Laura Becerra Vázquez María Obdulia González Fernández Grado de contribución: igual
Visualización	María Obdulia González Fernández (Principal) Laura Becerra Vázquez (Apoyo)
Supervisión	María Obdulia González Fernández
Administración de Proyectos	Laura Becerra Vázquez
Adquisición de fondos	María Obdulia González Fernández