Critical Incidents during the implementation of Project based learning and Inquiry based learning in Primary Education: recommendations for their training and application.

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Abstract
A new tendency in education is becoming more in-style in Primary Schools. Project Based Learning (PBL) and Inquiry Based learning (IBL) are conceived as the proper methodologies to face the current society. However, even education experts, such as Bona and Robinson (2015), support these methodologies, it seems to be a reluctant attitude to apply them in a widespread manner. This new approach calls for a different teaching-training program that could be based on Critical Incidents (CI). As, Bilbao and Monereo (2011) pointed out CI are learning sources, from which professionals can develop and improve their practice. On the basis of these ideas, the present study examines (1) the different CI that teachers experience while the application of those methodologies, taking years of experience into account. Since, prior studies suggest teachers tend to improve with experience (Xu, Hannaway, and Taylor, 2009). Moreover, (2) it investigates the possible solutions of different CI while applying PBL and IBL in the classroom. The research aims at making an important contribution to guide and update teachers' training. A interview and a subsequent analysis was conducted to obtain the results. The preliminary results showed that beginner teachers are more concerned about possible CI related with the interactive triangle dimensions. Instead, experienced and veteran teachers care more about the teaching areas of influence. Moreover, the main CIs are related to time, whether time for planning, time for professional coordination or time for reflection; being at the same time considered as solutions for overcoming several of the CIs described. Finally, some final recommendations for practice improvement are also provided.

Key words: Project Based Learning, Inquiry Based Learning, Teacher's Training and Critical Incidents.

Resumen
Hay una nueva tendencia educativa que va ganando más peso en las escuelas de educación primaria. El aprendizaje basado en proyectos (PBL, por sus siglas en inglés) y el aprendizaje basado en la experimentación (IBL, por sus siglas en inglés) se conciben como las metodologías adecuadas para hacer frente a la sociedad actual. Sin embargo, aunque los expertos en educación, como Bona y Robinson (2015), apoyan estas metodologías, parece existir una actitud reacia hacia su aplicación de manera generalizada. Este nuevo enfoque requiere una formación diferente, éste podría basarse en Incidentes Críticos (IC). Tal i como Bilbao y

Monereo (2011) señalaron: IC son fuentes de aprendizaje desde dónde los profesionales pueden desarrollar y mejorar su práctica. Siguiendo estas ideas, se examinan en el presente estudio (1) los diferentes IC que los maestros experimentan durante la aplicación de dichas metodologías, teniendo en cuenta, en todo caso, los años de experiencia. Puesto que, los estudios anteriores sugieren que los maestros tienden a mejorar con la experiencia (Xu, Hannaway, y Taylor, 2009). Por otra parte, (2) se investigan las posibles soluciones de diferentes IC durante la aplicación de PBL y IBL en el aula. El objetivo de la investigación es hacer una contribución en la guía de la formación y actualización de los docentes. Se llevaron a cabo entrevistas y sus posteriores análisis para obtener los resultados. Los resultados preliminares mostraron que los profesores principiantes están más preocupados por los posibles IC relacionados con las dimensiones del triángulo interactivo. En cambio, los maestros experimentados y veteranos se preocupan más por las áreas de influencia de la enseñanza. Por otra parte, los principales IC están relacionados con el tiempo: el tiempo para la planificación, el tiempo para la coordinación y el tiempo para la reflexión profesional; siendo, a su vez, considerado la solución para superar varios de los IC descritos. Por último, también se proporcionan algunas recomendaciones finales para la mejora de la aplicación de estas metodologías.

Palabras clave: Aprendizaje Basado en Proyectos, Aprendizaje Basado en la Experimentación, formación docente e incidentes críticos.

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1. INTRODUCTION

The current tendency in education has changed during the last decades. Education is not any more conceived as teacher centred; instead, the focus has moved towards the students and their implication on the teaching learning process. Although OECD (Dumont, Nstance, & Benavides, 2010) supports this drift change and it can be seen in many classrooms already, it is not clearly supported by the educative authorities. Instead, education policies remain as they were shaped in the 19th century. While education should aim at providing students the necessary skills and knowledge to understand, construct, modify, and adapt to the current outer world (Robinson & Bona, 2015); it still focuses on the reproduction of information set forth in a paper exam. A bulk of schools are still classifying knowledge into different areas, delimiting how students receive, classify, and store learning in different subjects. This knowledge distinction can only be

detected in schools. In real life, people face situations through a holistic perspective of knowledge. Ergo, various education experts, such as Robinson & Bona (2015), propose a new education system, which should be organized in disciplines instead of subjects. This conception enables schools to organize all the activities with an interdisciplinary-focus, where problems and concepts can be approached from numerous perspectives. Thus, different techniques and contents help to understand different situations holistically. Moreover, the proposal goes in accordance with Dewey (1859-1952) who alleged: *"education is not preparation for life, education is life itself"*.

This new conceptualization of education leads to a new teaching/learning methodology: the Project-Based Learning (PBL). The "project" definition in education field is based on Piaget ideas and learning by doing ideas from Dewey (1897). Hence, it is *"a concept dating from the 17th and 18th centuries, belonging in the same category as the "experiment" of the natural scientist, the "case study" of the jurist, and the "sand-table exercise" of the staff officer"* (Michael Knoll, 1997). In 1997 Knoll stated that the methodology had two different implementation models, which were already detailed in the 19th century. Thus, it is not a new methodology. PBL permits students facing the curriculum with a holistic perspective. In PBL the project per se is the axis of the learning process, from which subsequent knowledge emerges. The methodology can be even more complex aiming at the full learner development, directing students to learn how to learn from the very beginning. Ergo, questions can foster that learning independency. Wortham (2014) affirmed: *"Students and teachers who learn this way become disposed to ask good questions, listen carefully, provide evidence to support their claims and remain open to new possibilities. This encourages adaptability and is important preparation for a rapidly changing world."* Therefore, it is proposed to use PBL in association with Inquiry Based Learning (IBL), which could foster a better autonomy in the process of the autonomous construction of knowledge. Educational Bureau of Hong Kong (2002) defines IBL as:

> *" Student-centred approach which helps students to integrate generic skills, knowledge and values in the learning of General studies (...) in the IBL process the students are active constructors of knowledge and the teacher is a facilitator of learning". (p. 11, seen at Ken Chow, Shek-kam Tse, Carol Collier Kuhlhau, (2008). Grade 4 students' Development of Research Skills through Inquiry-Based Learning Projects. School Libraries Worldwide Volume 14, Number 1, January 2008, 10-37. Retrieved January 4, 2016.*)

The empowerment of an active and autonomous knowledge construction responds to the current real world demands. In order to achieve it, the involvement of engagement and inquiry are utterly necessary. Pinar Sismek (2010) and other education experts assert that through active participation in the learning process coupled with an appropriate teacher guidance and scaffolding, engagement is empowered and, at the same time, it leads to the development of critical and logical thinking.

The use of PBL complemented with IBL as a new education approach calls for a different teacher-training program. It cannot be properly applied if teachers are not prepared for it. In like manner teachers cannot be asked to develop a methodology that they have not been trained for, even if some schools are already attempting to apply them. While it is true, it has also been suggested that teachers tend to improve with experience (Xu, Hannaway, & Taylor, 2009). Therefore, teachers could also improve their PBL methodology while practicing. However,

Bilbao & Monereo (2011) mentioned that all teachers experienced same type of problems, regardless their level of experience. Hence, teacher's training should be approached in PBL and IBL. This is one of the main questions this research tries to answer to. Moving forward on this direction, a solution is required in order to adapt teacher's training responding to the new classroom demand. Prior studies on teacher training suggest the need to look for new programs based on critical incidents (CI) (Bilbao & Monereo, 2011). CI are defined by Everly and Mitchell (1999) as: *"events enclosed in time and space that cause emotional disequilibrium in the teacher's own professional self perception once exceeded the individual emotional threshold" (Bilbao and Monereo (2011 p. 4))*. Nevertheless, following with Monereo and Bilbao ideas, CI are already considered learning sources. CI are seen as tools for analysis and action in order to improve teaching practice. Consequently, CI ought to be analysed to pull out the aspects that set them up, which will help defining the main topics in the new teacher training. Likewise, a training based on CI means to design a training program based on experience and real facts, that can help future professionals to foresee possible difficulties likely to arise during the teaching practice. Hence, the future teachers would take advantage of the positive effect that learning contextualization and tools facilitation could have on their cognitive and emotional self-regulation.

This study aims to contribute to the teacher training updating; focused on the adequate application of IBL and PBL in Primary stage lessons. On the basis of the ideas previously exposed, there are two primary aims of this research: (1) To examine the different dimensions of CI that can arise during IBL and PBL application. (2) To study the possible solutions of different CI while applying PBL and IBL in the classroom. The research findings should make an important contribution to guide and update teachers' training.

The hypotheses regarding the objectives of the present paper are the following: (1) Following Monereo (2011) proposal, the main CI arisen in IBL and PBL will be related with the lack of teacher training on those methods. Moreover, the years of experience may also be related with the CI while applying these methodologies (Xu, Hannaway, & Taylor, 2009)). Finally, lack of agreement in the application of the methodologies in schools might also be related with the CI (Robinson & Bona, 2015). Looking at the second research aim (2) it is expected teachers to be able to propose some possible solutions.

2. METHOD

The present study used qualitative analysis to gain insights from face to face interviews. The sample was chosen according to the teachers that voluntary agreed to participate. Thus, it is composed by 8 teachers (3 men and 5 women); who have been chosen due to their years of experience, being that variable considered important for the results of the research. Therefore, the sample is composed by 3 teachers with less than 10 years of experience (beginners), two teachers with between 10 and 30 years of experience (experienced) and 3 teachers with more than 30 years of experience (veteran). All of them were in service at the moment that the research was carried out except two that were already retired.

In order to carry out the research a semi-structured interview was designed so as to obtain information about the two objectives that it had: (1) To examine the different dimensions of CI that can arise during IBL and PBL application. (2) To study the possible solutions of different CI while applying PBL and IBL in the classroom. The volunteers were asked to answer

different questions grouped into different parts. The first part was aimed at the description of IBL and PBL with the participants' own words. Afterwards, they were questioned about their own practice, to know if they actually use or not the methodologies. The third part of the interview focused on the actual CI that they had experienced during the practice of these methodologies, or some techniques that could be associated with them, and their response towards those difficult situations (CI were named like that during the interviews in order to try to do not negatively impact on the volunteers). The last part of the interview examined teachers' opinion about the reasons that could lead a spread resistance of these methodologies. Last questions aimed at discovering what is lacking in teachers in order to do not actually use IBL or PBL in class.

Prior to data collection the participants received information about the research itself and its objectives. Afterwards, teachers were asked to discuss about the different interview questions in order to collect the necessary information to examine the different CI and teachers' methodology conceptions. Later on, the information was organised in a result chart with the following criteria: (a) gender, (b) years of experience, (c) work situation, (d) PBL and IBL characteristics (defined by themselves), (e) relation between PBL and IBL, (f) the use of those methodologies, (g) the CI cited, (h) the solutions, and (i) the reasons of spread resistance. Once the data filled the chart, the CI were selected and organized into different categories. Finally, the results were compared taking into account the years of experience to establish whether there is a connection between the variable and the CI typology.

3. RESULTS

Results have shown the agreement of the overall sample regarding IBL and PBL conception. First of all, the significant coincidence among the 8 participants was the understanding of IBL as part of PBL, instead of considering it as a methodology by itself. The participants on the whole demonstrated that the main concern they had was the vast amount of necessary time to invest in the design and planning lessons based on these methodologies, as it can be seen in Table 1. Whilst only one teacher (beginner) stated that the nature of PBL is the cooperative work, all agreed describing PBL as a methodology based on students' interest, where learning is based on an experimental and practical perspective. Moreover, the overall respondents agreed that its great strength is the increase of student's motivation.

With regard to the application of PBL and IBL, 50% of the sample uses them only once a year due to the administration call for a minimum application of a project design. The other 50% declares to apply partially those methods, and only one expresses his intention of applying it as much as possible (observable in Table 1).

Concerning the different Critical Incidents detected from the semi-structured interviews they have been classified in five dimensions, which emerged from the Grounded Theory analysis conducted with the interview transcripts. The dimensions categorized were related to the interactive triangle (teacher-students-content) and from the areas of influence of the teaching practice: from the class (small area) to the learning community (big area):

a. Education community: CI that concern teacher, parents and non-teaching staff.
b. Teachers concern: CI that involve teacher's feelings and worries.
c. Lesson environment: CI centred on the class situation
d. Content issues: CI involved in the topic, explanations and activities themselves.

e. Students: CI that centre the attention on the students' attitudes and difficulties.

Table 1 shows the different CI, their description and, finally, the number of teachers that mentioned them, being that criteria the order of appearance of the different dimension and their CI.

Table 1. Main interview results organized by dimensions

Critical Incidents while applying IBL, PBL methods or techniques	Number	Years of experience	Use of methodology	Solution
A. Education Community:				
1. Coordination (vertical and horizontal) Understood as an agreement among all the teachers of the school to plan the objectives, contents and activities that each student's group has to do.	7	Beginners Experienced Veterans	Superficially Only once or twice a year Yes (with external limitations)	More time for preparation and vertical and horizontal coordination
2. Already bought material The importance of using the material that the school and parents have bought at the beginning of the School year.	5	Beginners Experienced Veterans	Superficially Only once or twice a year	Plan in advance the necessary material.
3. Families collaboration Understood as the awareness of the collaboration importance in order to success in the implementation of any methodology. Since, the intervention should be in correlation between school and family.	4	Beginners Veterans	Superficially Only once or twice a year Yes (with external limitations)	Make families understand the importance of collaboration.
4. Constant criticism and demand of explanation. Parents and other teachers feel reluctant about the methodology, so they ask for results and reasonable explanations.	3	Beginner Veteran	Yes (with external limitations) Superficially	Firmly believe in the methodology *"Think in the objective of teaching and keep going with the methodology"*.
B. Teachers concern				
1. Vast amount of planning time The time needed in order to plan a DU or	8	Beginners Experience	Superficially Only once or twice	More experience, more material to use. More peer collaboration.

activities based on that methodologies is remarkably more extended.		d Veterans	a year Yes (with external limitations)	Necessary: afterwards reflection to keep improving.
2. Vast amount of necessary time to develop the activities The results are not immediate, and sometimes the new content explanation take more time that expected in the planning.	3	Beginner Veteran	Superficially Yes (with external limitations)	Patience, the results will come out eventually.
3. Learning process control In the traditional method the teacher is the responsible to administrate the time, the activities and the content explanation, the whole process: input and the control of the outputs si controlled directly by the teacher, in PBL, IBL this changes.	2	Beginner	Only once or twice a year Firmly believe in the methodology	Experience, relax and firmly believe in the methodology.
C. Lesson environment				
1. Noise	3	Beginner Experienced	Only once or twice a year	Understand that the methodology demands that environment.
D. Students				
1. Reading skills Referring to some difficulties that students face while the UD planned, that are not directly approached by the teacher.	3	Beginner Experienced	Yes (with external limitations) Only once or twice a year	Use different methodologies to work on specific contents
2. Motivation				
i. *Dwindling Motivation* (due to too long activities)	2	Experienced	Only once or twice a year	Short activities, focus change.

Some students, mainly little ones, experiment a decrease on their motivation if the activity is too long or the DU is too extensive.				
ii. *Traditional method preference* Some students disagree with the application of PBL or IBL techniques.	1	Beginner	Yes (with external limitations)	Provide the cooperative learning environment first.
iii. *Lack of general interest* Some teachers have observed that students' general interest towards school is negligible.	1	Veteran	Only once a year	No solution elicited
3. Different roles assumption in cooperative work Cooperative work leads to the adoption of different roles while doing an activity.	1	Beginner	Yes (with external limitations)	Make students adopt a different role depending on their individual characteristics.
4. Students conflicts due to cooperative work Referring to those conflicts that can arise among students while working in group.	1	Beginner	Only once or twice a year	Work on social interactions
E. Content issue				
1. Too difficult material The material used in the activities is not adapted to the ZPD (Zone of Proximal Development) of the students.	1	Beginner	Yes (with external limitations)	Work from easier to more difficult. (less abstract to more abstract) Ready to adapt the plan.

From Table 1 it can be easily verified that the most mentioned dimension was **(a) Education community** and **(e) Content issue** was the lesser one.

Starting with the most mentioned dimension: **(a) Education community, t**here is a CI that was exposed by 7 out of the 8 participants of the study: **(1) the coordination among teachers.** This responds to the need of different subjects connection, which was exposed by two of the teachers when a definition of PBL was asked but it was mentioned by the main bulk of the sample, during the description of the methodology application difficulties. The coordination is understood as a vertical and horizontal process in a school, thus, it is necessary to be in relation with both the teacher that intervene in the students group lessons at that moment, and all the teachers body to settle down a coordinate plan all through Primary level.

The second CI related with the first category, exposed by 5 participants of the study was **(2) Already bought material.** The teachers declared that even they were obligated to use PBL once a year, the books that were bought by the school must be finished at the end of the school year, even the project planned may last longer than a textbook unit normally does, at the same time many other contents are addressed. Hence, the book must be completed even a project is developed and the contents are already seen from another approach.

Following with the second dimension: **(b) Teacher concern,** there is a CI that was illustrated by all the participants in the study: **(1) Vast amount of planning time.** This responds to the need of applying a new methodology and the teachers' lack of experience and the available resources. For that CI teachers suggest a clear solution: more experience and resources to use. Hence, time to be able to apply and reflect about it. The second CI related with this category, exposed by 3 participants: **(2) Vast amount of necessary time to develop the activities;** is related with the learning/ teaching process and the nature of the methodology, which demands time to integrate some new contents in order to construct new knowledge. The last CI of the second category was only exposed by two participants; significantly both of them were beginners: **(3) Learning process control.** This also responds to the nature of the methodology which transfers the learning process control to the students, and the teacher become an observer guide. A possible reason for that particular CI to happen is the lack of experience, and following that idea teachers propose time for experience and firmly believe on the methodology as the solution.

The third dimension: **(c) Lesson environment** is only composed by one CI exposed by 3 teachers who belong to the same school: **(1) Noise.**

Interestingly the dimension **(d) Students;** contains several CI that were exposed maximum by 3 teachers during the interviews, most of them were only disclosed once. It seems relevant that the solutions proposed for all the CI of the dimension focus on individual adaptation taking into account students needs, such as shorten the activities or enable students to adopt different roles depending on their individualities. One of the most striking results emerged was **(iii) Lack of general interest;** only exposed by a veteran that introduced herself as a burnout teacher at the beginning of the interview. The teacher explained that the students showed non-interest about any school issue, and this could not be solved nor with PBL or IBL. The last CI belonging to that dimension is **(4) Students conflicts due to cooperative work.** This is related with the work group: a demand of the methodology; it leads to different social interactions that can end up with disagreements and conflicts that need to be faced. Hence, there are some social skills, as

the participant pointed out that need to be worked and considered when working with these methodologies.

Taken together, these results suggest that there is an association between time of experience and some CI. Nonetheless, from a Table 1 analysis it seems that beginner teachers are more likely to evaluate the CI regarding the three elements of the interactive triangle, whereas experienced and veteran look deeper towards the teaching practice areas of influence.

4. DISCUSSION AND CONCLUSION

This paper aimed at examining possible CI that are likely to emerge while applying PBL or IBL in a Primary level lesson. The first surprising finding was that while the participants described the methodologies as the desirable models of education, no one totally applies them during the lessons.

According to the findings, the hypotheses were partially confirmed. On the one hand, this paper hypothesized about the correlation between the years of experience that teachers had and the emergence of CI, in relation with Xu, Hannaway, and Taylor (2009) findings on teachers' tendency of improvement in relation with the years of experience. It has been partially confirmed. Some of the CI were only mentioned by beginner teachers, and they suggest that the solution might depend on the experience. However, results showed that there were some other CI that were equally important by all the participants, without being influenced by the professionals experience; this was the importance of the education community support. This finding is in agreement with those obtained by Bilbao & Monereo (2011) in which regardless teacher's level of experience, they all experience the same type of CIs. However, it is also interesting to point out that there are some differences regarding the CI dimensions and the years of experience of the interviewees. Surprisingly, beginner teachers care more about the interactive triangle and comment more problems in relation with it in comparison with the experienced and veteran teachers. It can be consequence of the recent training that those teachers have attended lately. They seem to be more concerned about the importance of the different agents of the learning activity. The lack of expertise appears to make them paying more carefully attention to students and what occurs inside a classroom. Moreover, the CI dimension most mentioned was **(a) Education community.** Ergo, the results suggest that the agents who embrace the teaching practice do not totally agree with the application of these methodologies. Consequently, teachers who feel like implementing more strategies based on these methodologies, expressed feeling pressurised (observable in table 1: a.2; a.3 and a.4). This pressure taken together with the lack of strong belief in the methodology leads to a low PBL or IBL strategies use.

The results suggest that there is a strong relationship between time and PBL and IBL implementation. Since, the most mentioned CIs are related with it: whether time for planning, time for professional coordination or time for reflection; being at the same time solutions for removing several of the CIs described. Thus, time is understood as both a reflective space and practice experience. A surprising finding is the CI detection regarding some intrinsic characteristics of the methodologies such as coordination, planning time, noise, cooperative groups and motivation. This finding could be explained, again, by the fact that the application of this methodologies are not totally supported by the administration (Robinson, Bona, 2015), consequently the training has been not truly modified and the teachers who decide to apply PBL

discover these characteristics during the same practice, while they do not have tools to face or even predict them.

According to the findings, surprisingly, the interviewees needed to reflect deeper to expose CI related with the interactive triangle, in particular, concerning students, who should be considered the focus on the learning/teaching process based on this methodologies (Dumont, Nstance, & Benavides, 2010).

As for the second objective of this research, from the solutions exposed by the interviewees there are some advices that can be inferred to apply PBL and IBL. The most interesting solution is the one related within the CI concerning the different roles that cooperative group demands. It emphasizes the importance of previous work on the methodology students' demands. Hence, work on cooperative learning is crucial to enable students to be capable of adapting different roles in a work group and cooperate between each other. It has been an interesting finding and it is likely to be further investigated in future research.

The increasing need for a renewed training focused on PBL and IBL implementation seems clear from the results obtained. It could be approach looking at the documented CI in accordance with Bilbao and Monereo findings on the learning source that CI represent for professional training (Bilbao and Moreno, 2011). The idea of a renewed training can reinforce the spread of these methodologies in primary School lessons, something that should be fostered as from the results it is obvious that they are not as much implemented as Bona and Robinson (2015) advice.

This paper has identified and categorised several CI related with the partial implementation of PBL and IBL in Primary Level lessons. The findings of this research attempts guiding a possible improvement of teacher's training program considering CI as valuable knowledge sources, and the solutions elicited by the participants of the research as valid options to diminish those problematic situations that can arise while the teaching practice. In general it seems that the lack of experience is the principal reason of the CI bulk in addition to the lack of time for coordination between teachers and planning. Even though the small sample size of the study, the results seem to be consistent. However, more research with larger sample is needed in order to confirm the on going results and to enrich the CI dimensions. Moreover, since the study has been limited to an analysis of face to face interviews it has not been possible to apply any of the solutions proposed in concrete cases, it would be interesting to do it in further investigations.

Recommendations for practice improvement

Regarding the recommendations for improving teacher practice on IBL and PBL, some ideas were extracted from the results of the interviews.

1. Reflect about the practice to look at the strengths and weaknesses, as the main idea introduced by all the teachers for being able improving the practice: learning from the practice.
2. Invest time on planning:
    a. Coordinate vertically and horizontally with other teachers to use time effectively and work cooperatively.
    b. Delimit the necessary material to be used when applying IBL and PBL.

c. Share knowledge with peers due to IBL and PBL requirement of interdisciplinarity.

3. Acknowledge about the methodology itself:
    a. To help teachers be ready for the intrinsic characteristics
    b. To increase teachers engagement towards the methodologies.

4. Work in a network, make all the members of the learning community part of the process, for the complexity of applying those methods.

5. Look at students needs to adapt learning activities, as these methods allows different levels of difficulty for the students. Those different levels should be based on the different levels of abstraction.

6. Before asking for a cooperative work, establish the basis of a cooperative learning environment. To be sure that students understand what a cooperative work is and how can it be effectively applied.

Recomendaciones para la mejora de la aplicación de las metodologías IBL y PBL

En cuanto a las recomendaciones para mejorar la práctica docente en IBL y PBL, algunas ideas se extrajeron de los resultados de las entrevistas.

1. Reflexionar sobre la práctica mirando las fortalezas y debilidades, como idea principal introducida por todos los maestros para poder mejorar la práctica: aprender de ella.
2. Invertir tiempo en la planificación:
    a. Coordinarse vertical y horizontalmente con otros maestros para utilizar su tiempo de forma eficaz y trabajar de forma cooperativa.
    b. Delimitar el material necesario que se utilizará en la aplicación
    c. Compartir el conocimiento con sus compañeros debido a la exigencia de interdisciplinariedad de IBL y PBL.
3. Conocimientos sobre la propia metodología:
    a. Para ayudar a los maestros a estar preparados para las características intrínsecas de la misma.
    b. Para aumentar el compromiso de los profesores hacia el uso de las metodologías.
4. El trabajo en red. Hacer a todos los miembros de la comunidad educativa parte del proceso, por la complejidad de la aplicación de estas metodologías.
5. Adaptar las actividades de aprendizaje a las necesidades individuales de los alumnos, aprovechando que el método permite la aplicación de diferentes niveles de dificultad. Estos niveles deberían basarse en los niveles de abstracción.
6. Establecer las bases de un ambiente de aprendizaje cooperativo antes de solicitar un trabajo de este tipo. De esta forma se asegura que los estudiantes entiendan lo que significa un trabajo cooperativo y cómo pueden aplicarlo de forma efectiva.

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