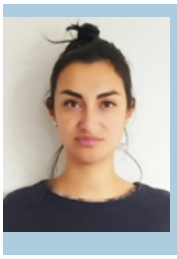
REFLECTING ON TEACHING PRACTICE: A TOOL FOR TRANSFORMING CLASSROOM DYNAMICS



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ABSTRACT

This paper presents a reflection on the pedagogical practice of the author, who guides the subjects of physics and mathematics at the Fusca Educational Institution at El Cerro in the municipality of Chia Cundinamarca and who has noticed the benefits of thinking the classroom as a natural laboratory to observe the particularities of the teaching-learning of physics as a science and the transcendence of this process to the classroom. This reflective exercise is framed in the vision of the teacher as a researcher who has the resources to act in new situations, always from his daily work, reflecting on his action without having to interrupt it, which brings the enormous advantage of reorganizing what he is doing while he is doing it, confirming that in this way the professional knowledge of the teacher emerges in and from practice.

Keywords: teacher reflection, school context, formative assessment, science teaching, learning.

INTRODUCTION

In order to improve the pedagogical practice, every teacher should carry out an exercise of meta-reflection that allows him/her to analyze his/her practice and obtain information about the processes that take place inside the classroom to reorient his/her objectives and actions in the classroom. In this regard, Talanquer (2014, p.393) states that what is really useful is not to document what the teacher knows, believes and feels, but the analysis and characterization on the use of his cognitive bases in the classroom to: “a) Face different didactic situations on specific contents in varied contexts, b) Justify his decisions and actions, and c) Reflect

on his own knowledge and beliefs". This teaching exercise is defined as Content Specific Pedagogical Reasoning (RPEC) and provides tools to guide the teaching process and direct it towards the fulfillment of learning goals set at the classroom, institutional and educational policy levels.

Therefore, teachers must reveal their thinking through a meta-cognitive exercise in which they reflect on what their decisions and actions say about their knowledge, beliefs and attitudes towards teaching and learning of the discipline they teach in the classroom, in order to locate and include improvement alternatives that benefit students and transform their praxis.

REFLECTING ON SCIENCE TEACHING IN ORDER TO CHOOSE A PARADIGM THAT FAVORS ITS LEARNING.

Shulman (2005) mentions that teaching consists of looking for ways to transmit ideas so that students can come to know, discern, understand and become experts in a given subject, then, the teacher must understand what he/she is going to teach and must know how to do it, therefore, teaching culminates when there is a new understanding on the part of the teacher and the students. According to this author, the essential aspects of teaching are the objectives that students learn to understand and solve problems, that they learn to think critically and creatively, and that they learn data, principles and procedural rules (p.10).

Science education is necessary to develop a creative potential in students, therefore, the science teacher must question himself about why and why to teach it, and proceed to take a look at his practice that leads him to take stock of his role in the classroom and allows him to analyze the role he plays within the process and what he is contributing as an individual educator to the educational intentions of the country, since his responsibility goes beyond the classroom because he must offer his students an archetype of their reality.

Based on this foundation, the teacher noticed that in order to carry out her teaching she was only concerned about bringing to class contents listed in the curriculum without worrying about the existing relationship between them and making it evident to the students; however, she expected them to realize these relationships on their own.

At this point, the teacher recognizes the first element of transformation of her practice, since she no longer gives only protagonism to the mathematical application of physics, but what concerns her most is that the concepts are understood and the importance they have for the immediate environment of the student. Seeing science teaching in this way encompasses the conception that science is also a system of values as Bowler and Rhys (2007) state, and therefore, it is a social activity that seeks professionalization and disciplinary specialization in which the creation of new techniques and conceptual innovation are crucial for the development and advancement of the world and reflect the interests of those who carry it out, expressing their values, consequently, science teaching should aim at all dimensions of being.

This change in the teacher's perception is due to the fact that science is not seen as a set of topics to be transmitted individually, but as a set of structuring concepts that form a network of knowledge and aim to explain a phenomenon that encompasses many points of view and can meet different needs, having a deeper impact on the student's thinking. With all this, the science teacher must become aware that his role is not to transmit a succession of mathematically expressed concepts that must be repeated by the students, but to accompany his class to discover in science a way of approaching reality to improve their living conditions by applying it to the invention and manufacture of goods that produce technology.

Within the practice it became evident that the teacher thought that disciplinary knowledge is the most important for the teacher because it determines that students know adequately a discipline and have clear scientific bases on which it is based, therefore for her the most appropriate way to learn science was memorizing concepts and algorithms that are generally away from the context of the students, in addition, she thought that the teaching of science should be the same for everyone because it is a formal knowledge that is not questionable, so the evaluation becomes a tool to see if the learner knows or does not know, so the way to evaluate in a closed way and at the end provides information about the effectiveness of the teaching learning process and the teaching of science should be given in a linear way, since the important thing is that students know all the theoretical approaches of physical science.

It is interesting to see the way in which science is taught in the classroom, since teachers in this field have limited this practice to the simple fact of asking questions, scientists have never left the age of the whys and, on top of that, they pretend to be contagious (Golombek,

2008), so we should aim at a competency-based science education that takes into account "the active participation of students in the classroom, and not the typical vertical transmission of information or the use of laboratories based on prescriptions" (p.32).

From these approaches, the teacher must understand that educating in science involves teaching to "think", "do" and "communicate" about the events of the natural world (González, 2016), then the teaching - learning of physics (in this particular case) does not have to be limited only to the knowledge of the theory and epistemological foundations of the discipline, but must also influence everyday lives, achieving a long-term impact on the student's environment, not to make him scientific, but to make him and his community literate in science.

This point of view made both the teacher and the students mobilize their thinking and understand that science classes are not taken to become experts in a discipline but to develop skills and competencies that can be transversal to other areas and allow them to respond to the needs of their environment, so there are many ways to learn science and these can be framed within learning and teaching strategies that make use of different techniques and tools that achieve both qualitative and quantitative science learning and can be applied in the solution of problems close to the school.

KNOWING THE ELEMENTS OF THE TEACHER'S PROFESSIONAL KNOWLEDGE IN ORDER TO VALUE TEACHING PRACTICE

Continuing with the look at the teaching practice in the classroom, it is necessary to indicate that there was a marked tendency in the teacher to think that the knowledge of the content should be the only and strongest of the components of her profession when intervening in the classroom for the teaching of physics, however, through observation and recording, However, through observation and recording, he recognized that in the dynamics of the classes there are other aspects that influence the teaching-learning process and that in addition to the curriculum that is structured for the teaching of science, the so-called hidden curriculum implies that teachers consider other aspects of their training that give a professional character to their performance and delimit the role of the teacher from that of other professionals who would like to enter the classroom.

Shulman (2005) points out that the teacher's professional knowledge has four components that define it: knowledge of the disciplinary content, pedagogical knowledge, didactic knowledge of the content and knowledge of the context. From these components it is clear that the teacher requires knowledge that allows him to interrelate and integrate scientific and everyday knowledge, but also needs to integrate psycho-pedagogical knowledge and professional experience to achieve the transformation of the disciplinary logical structure of the theoretical knowledge he is teaching (Valbuena, 2007) and thus design the planning, choose appropriate teaching strategies and select the tools and techniques that best suit his students.

Having said this, once the disciplinary and pedagogical aspects to be worked on in the classroom have been defined, teachers must also know how they are going to do it, since the way they bring the contents to the classroom depends to a great extent on whether students will actually learn, which is where the importance of didactic knowledge of the content lies. Therefore, although the knowledge of the discipline and its structure influences the way it is presented to students, the didactic knowledge of the content is the central component around which the others are integrated, becoming a hallmark of the professional knowledge of the teacher, whose work is characterized by "having a heterogeneous object, setting long-term objectives, involving complex relationships and having an intangible and immaterial product" (Tardif (2004) cited in Valbuena, (2007), p.31).

From these approaches, the teacher understood that the teacher's professional knowledge has some components that must be addressed simultaneously to have an effective teaching practice and that taking them into account in the planning requires being very clear about what she wants to teach, how she is going to do it and why she is going to do it; these three questions seek the integration of her knowledge in order to improve the practices in her classes and the success of her students to achieve understanding.

TRANSFORMING CLASS PLANNING TO TRANSFORM THE POTENTIAL OF TEACHING PRACTICE.

On the other hand, the teacher noticed that in her practice she did not take into account the foundations of a particular pedagogical model or a teaching framework that defined class planning, therefore this exercise was not done, which led to classroom activities that, although

they were related to the subject, did not have a clear objective within the development of learning and were directed to the mere fact of having what to grade and from where to get grades to meet the requirements of the educational institution.

Seeing how planning activities and having clear objectives for each one helps teachers to make their practice more effective by optimizing their time, the teacher appropriated Woolfolk's (2010) statement, who refers that planning influences what students learn, since it transforms the time available and the curriculum materials into activities, tasks and work for students, thus reducing uncertainty in teaching and providing results that lead teachers to "polish" their actions in class in order to improve them.

Consequently, the teacher now plans her classes within a teaching framework that allows establishing clear goals aimed at the development of skills and competencies in the students and that also direct the teaching process, serving as a guideline for the activities that are proposed, which has led to more productive class dynamics with meaning for all the actors in the process. From the framework of teaching for understanding (EpC) we found a way to take into account not only the students during the whole process in an active way, but also what they understand and how they express it, since it is of vital importance to know their thinking and how it accounts for the understanding achieved.

The journey of planning through ECE gives the teacher the satisfaction of feeling included in the class, not the only actor, but rather a mediator who shares with the students, listens to them and takes into account what is in their minds to set a course towards knowledge. Now, based on the experience planning for ECE, it is important for the teacher to think about how she can take advantage of this framework in the future with the students, and one of her great aspirations is to build a culture of thinking in the classroom, since, as Perkins (2001) states, culture is the greatest resource for teachers.

THE STUDENTS' CONTEXT AS A GUIDE IN THE SELECTION OF TEACHING STRATEGIES AND TECHNIQUES

Another characteristic of the teaching practice observed by the teacher was that the context of the students was not taken into account in any way, so their needs were not estimated and the planning was not grounded in the problems of their environment, so there

was no motivation. In this regard, it is worth mentioning that "knowledge of the context is constituted from different meanings and perspectives, where the teacher's own experience, training, life history and personality intervene in the construction of representations about this term" (Osorio, Hernandez, Soto, & Orozco, 2014), therefore, considering it provides inputs for the design of planning.

With all this, the teacher decides to start from the constructivist conception of school learning, which is based on the idea that the purpose of the education provided in the institutions is to promote the processes of personal growth of the student within the framework of the culture of the group to which he/she belongs (Díaz & Hernandez, 2002), to thus begin to appreciate all the attributes of the context that allow the design of strategies such as those pointed out by Osorio et al. (2014): Adapted to the characteristics of the students (by the teacher), of recognition and learning of the context, and for transformation and action on the context (by the student), transforming the teaching practice that now takes into account the conditions and circumstances of the students to select strategies, tools and techniques for the classes in search of effectiveness and efficiency.

RETHINKING EVALUATION AS A MEANS FOR TRAINING AND NOT AS A JUDGMENTAL ELEMENT

On the other hand, the teacher saw that in her usual practices the evaluation was limited to grading, it was purely summative (multiple choice exams in which the questions only asked for the use of algorithms), so it was convenient to take a look at the learning evaluation process of the subject to realize that evaluation should not be seen as an element of judgment and control but as a tool for improvement not only for the students, but also for the teacher and for the students, but also for the teacher and to account not only for what they learn but also for what the teacher teaches, so it is important to make room for a formative evaluation that involves students but does not treat them all in the same way, since each one has different needs (Harlen, 2013, p. 19).

Taking this into account, the teacher no longer thinks that getting many grades is advantageous, of course it is mathematically speaking, but she is no longer concerned about doing so many activities for grading, but to do few and of quality, so that this guarantees that there is learning in the classes, so that the long workshops and homework lose meaning if it

is not expected to involve the student's thinking, since it is more productive to do something small, but oriented to develop skills, than to do something mechanized. Multiple-choice tests, for their part, are now designed with questions that actually constitute a problem and merit student analysis, as well as other skills.

Thus, an important role is given to feedback and formative evaluation so that students can take away the importance of the grade and become aware of their progress and the moment of the process in which they are, through the continuous assessment of their performance. These two elements (continuous assessment and feedback) become articulating axes of the evaluation tools and techniques that guarantee a process that provides effective information to the teacher to feed his practice, since "continuous assessment is the process of observing how much students are understanding and offering them the necessary feedback to improve their work" (Barrera & León, 2015), achieving a substantial contribution to learning and it is through effective feedback that this is achieved, as it implies a vision of learning as a process in which understanding is actively constructed by students and helps them reach the next stage (Eric & Kendall, 1999).

OBSERVING STUDENT LEARNING IN ORDER TO MONITOR TEACHING PRACTICE

Regarding learning, Piaget defined it as the passive formation of associations lodged in thought (Siegler (2000) cited in Woolfolk (2010, p. 48)), in contrast, Vygotsky believed that learning is an active process that does not need to wait for the learner to "be ready", becoming a tool for development to reach higher levels from social interaction (p.48).

In this category, the teacher noted that her students are learning concepts in a structured way, since they can use knowledge from different levels to intervene in a problem situation, which is responding to the competency-based training approach, For which the teacher is taking into account the learning styles of the students to build the class planning and to choose the didactic strategies and tools to be used in them, thus establishing whether the teaching strategies are effective or not and thus being able to make decisions about the teaching activity and the way she is perceiving the context to approach the classroom.

From this consideration of the students' learning styles, which were identified from the application of the KOLB test, different didactic strategies such as problem-based learning

and different tools are used in order to favor the students' learning, such as thinking routines, protocols and graphic organizers that had not been used before in the classes.

In addition, students began to see the "error" as an opportunity to feedback their learning and not as something negative that indicates a lack of knowledge, so the dynamics of evaluation have become more productive and fruitful, making the process heterogeneous and participatory and moving away from the qualification as the focus of attention of both students and teacher.

Before, only the competencies and skills specific to natural sciences were taken into account to follow up on learning, however, it was found relevant to see that if students do not understand how scientific knowledge is generated and the consequences of its application, they acquire decontextualized scientific knowledge, which undermines the possibilities of it being used to make informed decisions (Gonzalez, 2016), Therefore, the need was seen to generate transversality with other subjects so that students develop metacognitive skills that allow them to contextualize what they learn and relate it to situations in their environment that can become problematizing and thus give science a more holistic view, placing learning strategies in the foundations of problem-based learning (PBL).

Using PBL has reduced copying in the activities because they are not so extensive and there is discussion about the results, so the practice became participatory. In PBL work, students progressively acquire knowledge independently guided by the teacher and also learn to apply new knowledge in the resolution of different problems similar to those presented to them (Vizcarro & Juarez, 2008), which gives them elements to identify their learning objectives, manage their time and work in teams.

Polya (1989) and Schoenfeld (1985) propose problem-solving strategies that, framed within a problem-based learning framework, potentiate the use of thinking skills that transcend the learned contents of the subject and enter the limits of teamwork, the use of ICT, communication of information, among others.

STUDENTS' THINKING, IDEAS AND BELIEFS AS A STARTING POINT TO GENERATE POSITIVE TRANSFORMATIONS IN THE TEACHING PRACTICE.

On the other hand, within the physics classes there was no certainty as to whether the students were really understanding what they were doing and their learning was taken for granted if they memorized or did mathematical operations, that is, the teacher had a vision of the students as imitative learners, which according to Bruner (1997, p.74), assumes that "the knowledge that is put in the mind is taken as cumulative, so that subsequent knowledge is built on knowledge that existed before", however Bruner (1997) also points out that the teacher can see students as thinkers and seek to understand what the student thinks and how he arrives at what he believes, seeing him capable of thinking about his own thinking and of correcting his ideas and notions through reflection.

At this point, it is notorious for the teacher that doing activities such as workshops in which the thought processes did not matter but only the fact of meeting the deliveries to cover the curriculum, doing things that motivated only some and forgetting the rest, caused that her thinking was never carefully analyzed, and she forgot that "when the student is put at the center of the educational process , the approach as teachers changes radically and gives the potential to define teaching in a totally different way" (Ritchhart, Church, & Morrison, 2014).

Based on the above, it is pertinent to mention that when thinking is made visible, not only do we get a look at what the student understands, but also how he/she is understanding it, so one of the factors that achieved a change in the classroom was the fact of seeing how the students' thinking provides the teaching practice with control over the learning process in order to make decisions regarding the activities carried out in the classroom.

It is interesting to see how the students' ideas are seriously influenced by the decisions made by the teacher in class planning, taking into account their context and their thinking, not only regarding the knowledge they are learning, but also the evaluation process and the school climate during the dynamics of the class.

After analyzing the students' perception of the class, one of the factors that the teacher identified as susceptible to improvement was the communication inside the classroom between student-student and teacher-student, since the communicative praxis should be understood as the competence that allows a systemic, horizontal and dialogic communication that favors

the teaching and learning processes in the classroom, a place where there is an encounter between communication and education, this competence achieves that the students' thinking is mobilized and that their beliefs begin to change.

When reflecting on one's own experience, it is noted that what should be improved in the communicative practice in the classroom is assertiveness, defined as a behavior in which the person neither assaults nor submits to the will of others, expressing their convictions and defending their rights, so it is related to efficient communication and stress control. It is then important to consider actions where the teacher does not reject the error and sees it as a failure to be punished with aggressive attitudes, but conceives it as a search stage in the process of approaching learning and understanding, thus changing the attitude towards conflict and improving relationships within the class, giving rise to dialogue and communication in which all parties are active and horizontal, where everyone is alternatively senders and receivers.

Kaplun (1998, p.63) suggests that "defining what we understand by communication is equivalent to saying what kind of society we want to live in", so it is appropriate to promote in students the ideal of a society where everyone listens to each other, where there is no intransigence, where they are assertive and affective in order to reduce so many hostile situations they face daily inside and outside the school.

IN CONCLUSION

Reflecting on teaching practice is an exercise that allows seeking alternatives for improvement that involve positive transformations that benefit the entire educational community and seek to improve the quality of education more and more, since it should not be taken for granted a permanent way of acting inside the classroom, since the work of the teacher is nourished by the experiences that enrich it with the passage of time.

As teachers, we should not think of an individual practice, but a practice that goes beyond the classroom and impacts the institution and creates networks with others to act in synergy in order to offer them the opportunity to learn in the classroom. synergy in order to offer students strategies that develop skills and competencies that allow them to understand their environment in order to transform it.

The teaching profession is a job that should be legitimized as one of the most valuable for society, since it is a fundamental part of the gear that makes it work and evolve to offer an increasingly promising future to children and young people.

It is concluded that teachers should aim to achieve social and effective communication, which is at the service of an education that achieves critical subjects of their reality, where dialogue and participation are legitimate to achieve a true transformation not only in the way of seeing science, but also in the way of sharing and communicating it.

REFERENCIAS BIBLIOGRÁFICAS

- Barrera, X., & León, P. (2015). ¿De qué manera se diferencia el marco de la Enseñanza para la Comprensión de un enfoque tradicional? Ruta Maestra, 9, 26–33. Retrieved from http://www.santillana.com.co/rutamaestra/edicion-9/pdf/4.pdf
- Bolívar, A. (2005). Conocimiento didáctico del contenido y didácticas específicas. Profesorado: Revista de Curriculum Y Formación Del Profesorado, 2(9), 1–39. Retrieved from http://www.ugr.es/~recfpro/rev92ART6.pdf
- Bowler, P., Bowler, P. J., & Rhys, I. (2007). Panorama general de la ciencia moderna. (CRÍTICA, Ed.).
- Bruner, J. (1997). BRUNER, J. La educación, puerta de la cultura. 2000. Aprendizaje Visor. Madrid. Capítulo 2. p. 63 – 83.pdf.
- Bunge, M. (1959). La ciencia: su método, su filosofía. (LAETOLI, Ed.).
- Calvo, G. (2002). EL DOCENTE: RESPONSABLE DE LA INVESTIGACIÓN PEDAGÓGICA, 9–11.
- Díaz, F., & Hernandez, G. (2002). Estrategias docentes para un aprendizaje significativo: Una interpretación constructivista. (McGraw-Hill, Ed.). México, D.F.
- Eric, C., & Kendall, B. (1999). Valoración continua *, 21–30.
- Fautapo. (2009). Manual de estrategias didácticas. (Fundación Educación para el Desarrollo, Ed.). Bolivia. Retrieved from file:///C:/Users/PAOLA/Downloads/manual-20de-20estrategias-20did-c3-81cticas-131025162734-phpapp01.pdf
- Garritz, A. (1999). El conocimiento pedagógico del contenido.
- Golombek, D. a. (2008). Aprender y enseñar ciencias: del laboratorio al aula y viceversa. Revista Iberoamericana de Educación, 1–88.
- González, M. P. F. J. M. G. R. A. W. E. R. M. (2016). Aportes para la enseñanza de

las ciencias naturales.

- Harlen, W. (2013). Evaluación y educación en ciencias basada en la indagación: Aspectos de la política y la práctica. Retrieved from http://www.fondation-lamap.org/sites/default/files/upload/media/IBSE assessment guide _ spanish.pdf
- Jane, L. (2013). Pensamiento Visible. Para El Aula, 7.
- Kaplún, M. (1998). UNA PEDAGOGÍA DE LA COMUNICACIÓN. (E. de la Torre, Ed.).
- Osorio, D., Hernández, Y., Soto, R., & Orozco, Y. (2014). El Conocimiento Del Contexto Como Un Conocimiento Profesional Del Profesor De Biología. Aportes De Cuatro Docentes Y Sus Experiencias. In VII Encuentro Nacional de Experiencias en la Enseñanza de la Biología y la Educación Ambiental y II Congreso Nacional de Investigación en la Enseñanza de la Biología (pp. 867–876).
- Perkins, D. (2001). ¿CÓMO HACER VISIBLE EL PENSAMIENTO?, 1–4.
- Polya, G. (1989). Cómo plantear y resolver problemas. (E. Trillas, Ed.) (15th ed.). México.
- Ritchhart, R., Church, M., & Morrison, K. (2014). Hacer visible el pensamiento. (Paidós, Ed.) (1st ed.).
- Schoenfeld, A. (1985). Mathematical Problem Solving. (Academic Press Inc, Ed.). New York.
- SED. (2007). Cuadernos de Currículo Colegios Públicos de excelencia para Bogotá Orientaciones curriculares.
- Shulman, L. (2005). Conocimiento y enseñanza: fundamentos de la nueva reforma. Profesorado. Revista de Currículum Y Formación Del Profesorado, 9(2), 1–30. https://doi.org/http://www.ugr.es/local/recfpro/Rev92ART1.pdf
- Talanquer, V. (2014). Razonamiento Pedagógico Específico sobre el Contenido (RPEC). Educación Química, 25(3), 391–397. https://doi.org/10.1016/S0187-893X(14)70554-3
- Tinajero, L. (2010). COMPETENCIA EN COMUNICACIÓN LINGÜÍSTICA: Competencia Lingüística vs. Competencia Comunicativa Resumen: Revista Digital Para Porfesionales de La Enseñanza., (6), 1–5.
- Tishman, S., & Palmer, P. (2005). Pensamiento Visible. Pensamiento, 4–6.
- Valbuena, E. O. (2007). EL CONOCIMIENTO DIDÁCTICO DEL CONTENIDO BIOLÓGICO: ESTUDIO DE LAS CONCEPCIONES DISCIPLINARES Y DIDÁCTICAS DE FUTUROS DOCENTES DE LA UNIVERSIDAD

PEDAGÓGICA NACIONAL (COLOMBIA). UNIVERSIDAD COMPLUTENSE DE MADRID.

- Vizcarro, C., & Juárez, E. (2008). La metodología del Aprendizaje Basado en Problemas. El Aprendizaje Basado En Problemas En La Enseñanza Universitaria, 9–32.
- Woolfolk, A. (2010). Psicología Educativa. (Pearson, Ed.). https://doi.org/10.1016/j.pse.2015.08.005