

*Review*

## **Strategic cocktail: Cognition and metacognition**

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**This theoretical reflection implies the main proposal that the activities of planning and teaching are linked; it is the main ingredient to cognition and metacognition. Two main parts make up this article: a theoretical discussion of the linkage, detailing a descriptive letter and content to be taught in the classroom. Within this part, a flowchart related to the master, content and topic is proposed, which are the results of the theoretical reflection. The concluding part of this reflection is considerations associated with improving the planning of teaching.**

**Key words:** Planning, cognition, metacognition, learning to learn, teaching, learning strategies.

### **INTRODUCTION**

Classroom means, among other things, the teaching processes that require a reference framework for planning the activities of teachers and students. The strategies are "ingredient" to consolidate learning spaces meaningfully and have quality teaching.

### **THEORETICAL DISCUSSION**

Programming acquires key meaning and functions to sequence students' tasks and activities: its engine is the didactic and involves sustaining the general purposes of the subject, objectives, competencies, contents (conceptual, attitudinal resources), teaching resources and assessments. All of the above supports the activities and tasks that give meaning to the school project: it is up to the teacher to combine them in his/her daily schedules.

Thus, and according to Parrilla (1996), this set involves developing a system of supports and the organization of resources, with three possibilities: a) pedagogical reinforcement, before the classroom, b) simultaneous reinforcement in the classroom and c) post-reverses reinforcement classroom. This indicates important planning moments: the possible combinations are many and there is no single way. It is from the classroom, from the students and from the content that it delimits the planning and determines if there is a need for special aids.

Teaching should consider, in addition to the above, that in daily or weekly programming the curriculum plays the guiding axis, since it points to the object of knowledge and takes into account the characteristics of the students, determines the adaptations and interaction formats for them. The learning hypothesis also shows both individual

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and group organizational supports. This hypothesis weighs optimal conditions for all to consolidate important learning. Therefore, the teacher, from this hypothesis, regarding content, makes the adjustments and can consolidate inclusive educational environments: strategies - tools of psycho-educational support - guide learning and accompany the teaching.

Follow-up is essential for the educational process to continue in the best conditions without forgetting that the student learns in a culturally determined way, building new knowledge from his previous knowledge and experience. This relationship between the new and the previous will be three conditions: the first is associated with your learning style, then there are the learning strategies that he or she has already used and, finally, her cognitive and metacognitive skills.

As for the styles used are the ones you have used, they can be preferences in the use of certain skills, vary according to tasks and situations, are flexible and can vary over time: the problem lies when there is no congruence in the classroom and the style of a schoolboy and the one used by the teacher. This last consideration is where the schedule fits: if the teacher can guide in the process of identifying different styles of their schoolchildren in the classroom, they could "act" on the modalities in an attempt to increase taking advantage of them.

Identifying styles allows you to describe the strategies of the students they use: it is up to the teacher to be attentive to the performance to make the student "face" with the new, more thoughtful information about why and for what. This one can be accompanied and guided by the teacher. There are, according to Pimienta and Prieto (2012), different types of strategies that can be used both in reflection and participation. There are four types of this reflection: strategies to investigate previous knowledge; strategies to promote the organization of information, group working strategists, and strategies to contribute to the development of skills.

By relating them to content and promoting reflection, the student modifies his knowledge; the teacher proposes an interrelationship between the new and the old, the strategy guides the process. If another strategy is required, it can be used and retried by schoolchildren and in that chain you "learn to learn". Teaching strategies are intertwined with learning and schoolchildren are almost certain to face and build more meaningful learning.

Thus, teaching and learning strategies are an interrelated set of functions and resources capable of generating action schemes that will make it possible for students to act more effectively in classroom educational situations. In this interrelationship process, metacognitive skills are necessary and useful for the acquisition, use, control of knowledge and also of other skills, such as the planning and regulation of the effective use of the resources themselves and bringing together strategies,

most of the time, have a positive impact on students' performance. Using metacognition as a resource in the classroom, students participate in complex cognitive development processes.

According to Pimienta (2012), the most significant metacognitive skills are: the planning and formulation of how, the control and evaluation of one's knowledge and the recognition of the usefulness of the chosen skill or, if necessary, choose ability. It is claimed that these ingredients are in the classroom and are resources that can be used from teaching and learning, as it will involve thoughtful thinking as a class resource.

The teacher can reflect on how, what plan, content characteristics, if there is previous experience, what worked and what did not work, which problems were solved and which were not, how I will know if the goal was achieved, there is a plan B and how I identify criteria for strategy programming.

These considerations will have as a backdrop the programming of strategies in the classroom where the difference is respected, the old knowledge is related to the new, conceptual, procedural and at-adytum content is linked, use different channels of perception and processing for learning, encourage participatory learning, teach metacognitive strategies, promote complex levels of thinking, and use different evaluation systems. This interrelationship of teaching and learning strategies could be outlined in a descriptive letter prepared by the teacher: each teaching strategy has one of the learning strategies. Activities are associated only with students (Table 1).

The preparation of this educational letter of facts involves identifying previous knowledge through the use of strategies, since previous knowledge and skills that have been used and that students have must be recovered and explained: it is recommended to use situations known to lead them to reflect on what has already been acquired and used. Once the previous knowledge and skills have been identified, it must be transferred to a target classification that must be developed in the form of purpose(s) and objective(s).

According to Bloom (1956), there are levels (knowledge, understanding, application, analysis, synthesis and evaluation) and there are verbs associated with these levels. From this it must be passed to the identification of knowledge through thematic delimitation. Teaching strategies should mix metacognitive with techniques associated with group dynamics: learning strategies should allow the student to develop, organize and integrate the new information. The teacher must promote group dynamics that promote analysis and synthesis, from the metacognitive and cognition of the students, the activities are associated with know-how: the metacognitive must be adjusted to the age of the students.

The main focus of this reflection is related to the cognitive approach and various assumptions to analyze

Table 1. Descriptive letter: Planning.

Primary school meaning of numbers		Grade	Unit		
Matemáticas	Teaching strategies	Learning strategies	Activities	Resources	Evaluation
example: Number sense and algebraic thinking theme: Significance and use of numbers subtheme: Natural numbers expected learnings: -interprets and represents numbers, at least up to 10. -comparing and collections, at least 30 elements. -communicates orally or through characteristic drawings of composed figures -use the reference system to play, describe and occupy positions of people or objects (Cfr. SEP, 2019)	Brainstorming Previous organizer Guided discussion Modeling in all these strategies the professor should explain the reasons to learn, such as the case of increase expectations and value success. Promote attention	Analysis Discussion debate and Learning to together Note: promote the intrinsic attraction of the use and utility of understanding numbers. Promote individual participation. formulating the self-evaluation of activities. activation of previous knowledge. from the whole group. Training of small groups to do a debate and promote analysis. Individual reading and elaboration of notes and exercises. Training small groups to identify characteristics of composed figures. Elaboration of individual summary	Activation of previous knowledge from the whole group. Training of small groups to do a debate and promote analysis. Individual reading and elaboration of notes and exercises. Training small groups to identify characteristics y composed figures. Elaborating of individual summaries.	Book Paper Pencils Colors Paint	Assistance Participation Elaborate a drawing where he or she can use a reference system to describe and occupy positions of people or objects. Develop an example

Public Education Secretariat (2019).

the educational process: it is interesting to insist that the participants in this process act and represent the context in which they are immersed. Likewise, the understanding of the working of the mind has been modeled on the metaphor of the workings of a computer. It serves as an explanatory model of how the psychological subject perceives information, how it represents, organizes and retrieves it with the purpose of directing its action in the world.

The main activity of the subject, then, is the information process and its result is the construction of knowledge about the world. Theoretical advances on the subject of cognition have developed a set of novel formulations about the process of functioning of learning, teaching and instructional theme. Two basic principles for this reflection are: a) the student and the teacher carry out construction and re-construction of the knowledge during socially framed situations and b) teaching and learning are social in nature and fulfill a socialization function.

From these principles, it is necessary to re-think the planning / programing and its impact on the participants

of the educational process, such as the case of teachers, students, family and the accumulated development of science. For the same reason, it is necessary to know and insist on re-conceptualization of the teaching as a systematic aid; that it is necessary to pay attention to the cognitive development of students in educational activities (formal and informal); to be able to design, in a very detailed way, the role of cognition and metacognition in the classroom and how learning will be achieved in the knowledge acquisition process (Bransford et al., 2004).

The constructivist theory has proposed the following formulation:

1. Knowledge is the result of the interaction between the content to be taught, the students' previous knowledge and the new information given to the teacher,
2. This process of re-construction continues continuously,
3. It is "operated" from this interaction combining on "...what is known, what is learned, what can be used, what can be improved and how can it be changed"
4. From the planning and programing of teaching, the

strategies can be related to the cognitive and metacognitive skills and can be designed to promote meaningful learning (Pimienta, 2008) and

5. It is necessary that the metacognitive skills are made explicit from the teaching and how they can be learned by the students for use in the class. This is associated with the idea of “transferring” useful information and actions when carrying out educational activities.

Thus, the decisions and link cognition and metacognition is a “proposition” for the teacher to plan class or sessions that promote development of complex thinking of the students. At the same time, planning /programming is cognitive metacognitive reflective, it is conscious, it is explicative and uses explanatory hypothesis understanding facts, concepts, procedures and inference. Self-directions emphatically use complex thinking skills both: simple [describes, and finds differences] and complex [explore, deduce, experiments] can be used when the students perform activities and tasks (Herrera 2005), and when they are needed.

Its importance is justified by also relating incidental learning with formal-academic learning, in that is possible to make use of previous experience and new ones, so that the deduction/inference is related to more significant learning of participants in the session (Rogoff, 1918). The teacher can design training activities, modeling, problem solving and work undertaken by novice-expert: it insists on the need to promote autonomy, positive interdependence and regulation (Swart et al., 2017). So there are enough conditions to promote participations, dialogues and complex thinking so that everyone perform socially and valued functions, both in projects and procedural activities, by just mentioning some tasks.

In the activities that are planned, it is a matter of making accessible the content to be addressed: the guide/supervision uses cognitive and metacognitive strategies, resources and tactics associated with instruction of the teaching process. The instructions are deliberative and systematic resources of how to accompany the re-working of what has been learned: it is “a staging process” where questions and examples are designed; those are resources not only of the teacher but also of the students, in friendly dialogues with academic content, and the conclusion is a result of working together.

This activation, which in addition is being relaxed with the cognitive and metacognitive strategies, allows re-elaborating activities to explore, discover and systematize the academic information (Das et al., 1998). During the intellectual advance there are dialogues related to negotiation of arguments, with readjustments of behavior: an identical interest is not promoted, but exchange between peers, between teachers to agree on the characteristics of the action plan, on the points of differential views, on what has been useful is needed.

From the above, the participants move toward three possible actions:

1. To explore
2. To describe
3. To solve

To know how to do with sense of belonging; there are progressive empowerments; there are supports; there are links between peers / teachers and there is union between cognition and metacognition (Cfr. Das et al., 1998).

Therefore, they are the activities that give vigor to strategies since they can modify and adjust the skills and potentialities. In this dimension of programming, teachers must use a variety of techniques associated with group dynamics, preferences and interests.

Teachers should pay attention that activities can change learning and improve skills mastery, develop organizational habits and constancy at work: identify the importance of effective study strategies, improve social integration in the group, school and environment. Activities can be scheduled to increase motivation to participate: the more they are detailed, the more work is linked with goals and purposes together increasing participations. Perhaps using preferences and dimensions in scheduled actions will enable students to differentiate what assumes responsibility for such or such activity.

Learning activities should be characterized by a variety of individual and peer actions that allow everyone to contribute important aspects to the goal; they should pay attention to individual differences and group integration processes. An activity can include one or more students' skills. The role of the teaching is to monitor the actions so that everyone feels that the activity is relevant and the students “do” demonstrate” what they have already acquired, as a goal.

The programming of the activities may have three important considerations: actions involving autonomous activity, actions involving joint activity and how the negotiation of intensions is carried out (Aramburu, 2013: 54). The educational situations that delimit intertwining the circumstances of an activity, “... as a set of elements that frame and accompany the actions and interactions they generate...” in students. Activities may be related to motivational strategies that promote the intrinsic appeal of learning tasks through curiosity and interest and fostering self-assessment: giving reasons for learning, such as expanding expectations and value success, participation, autonomy and responsibility. Special attention will be given to those activities that recover and transfer to learning, since, according to Pozo (2000), recognition and evocation are important aspects in the processes of representation and acquisition of knowledge: cognition and metacognition can be useful to this process.

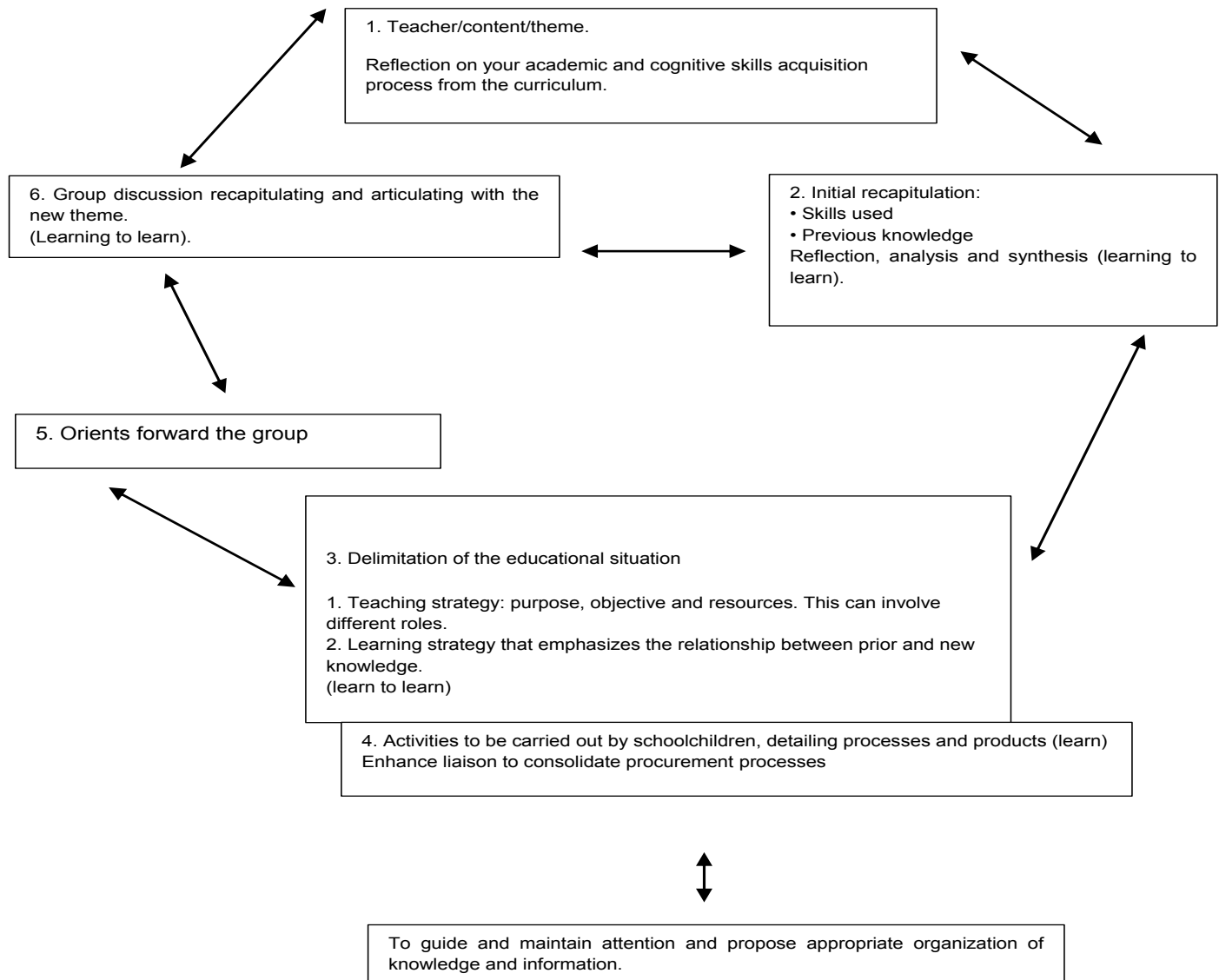


Figure 1. Flowchart: teacher/theme.

Thus, the learning contexts will allow the retrieval of information and transfer through the elaboration and organization of new information and constructive learning: it is what the student does that is meaningful, properly mastering, increasing understanding, remembrance, promoting the development of strategic thinking and cognitive progress of students. Special attention is to link the expected learning with the conceptualization of the student as an active subject that re-constructs their learning: the processes involved will be related to identifying, characterizing and recognizing situations to use and apply what they learned by promoting interest, curiosity and understanding of the meaning of the activities to be carried out.

Teaching strategies "scafate" because their use is

related to the level of competence presented by students in carrying out activities and to the level of prior learning that students have. They are modifiable, flexible and adaptable to the characteristics of the group: it is about them having progressive control of their skills and active participation of the educator and teacher is promoted by explaining forms of interaction and complex thinking skills.

Figure 1 is a flowchart that recapitulates this from the programming of teaching/learning strategies: as in a cocktail where the flavors make a pleasant palate of the taste taker. This metaphor refers to the idea of an integral whole, where the result is more than a sum of parts and the relevance only makes sense if it is conceptualized as an entity that self-regulates according to the needs of the

students, the type of content and the thematic delimited in the educational letter of facts.

The cocktail involves detailing, through strategies, the positive effects of group work, because you learn to accept differences, to cooperate, to increase personal safety and to facilitate the reflection on how to do: special attention will be given to create an environment that leads to the resolution of problems and in the development of group objectives, since there is a follow-up of goals and achievements allowing a purification of cognitive and metacognitive skills.

The purpose is to transform, through changes in their skills already achieved, the functioning of the group: reflection will allow the teacher/student to actively participate in the recognition of the most effective skills in autonomy, creativity, problem solving and self-regulation, just to mention significant characteristics of this learning to learn.

So, "... learning to learn involves the ability to reflect in a way that learns and acts accordingly, self-regulating the learning process itself through the use of flexible and appropriate strategies that are transferred and adapted to new situations (Diaz and Hernandez, p:12, cited by Herrera, 2005).

The detail of the ingredients of the programming (Flowchart) progress can be made in the humanistic content of the reflection of the classroom members, since metacognitive skills can be individualized. For example, from a previous organizer the breakdown of your most specialized considerations can make the role of the teacher guidance, since schools follow in the process in their know-how and use.

Consequently, the group learns to learn, since know-how is a property of the group that will mean that the procedures, by which the means are selected, are explicit and it is the responsibility of the group to make efficient the activities scheduled : your organization is circular (Russell, 1979) and the roles are role-playing. This cocktail meets basic skills and through reflection, they learn and teach efficiently: it is safe to do so and use them, they will, even if others of their own age will motivate them to want to acquire them. Of course, the role of the teacher is to guide through instruction when necessary.

Cognitive psychology (Klinger and Vadillo, 1997) provides a referential framework for cognitive strategies, as they promote activities to be skill-making and to enable an active and meaningful learning process towards students: that is, "... promote progressively more robust processes [supported by] the integration of old and new knowledge... [with] better storage and a retraction of knowledge... [more]... longer [and] more efficient" (p. 33). In addition to the above, and according to Klinger and Vadillo (1997), it is associated with cognitive modification ability and allows, "... improve performance, and skills..." reflection that will help identify significance of cognitive and metacognitive strategies.

Thus, metacognition involves self-regulation and self-assessment: control from learning to identify differences and similarities of chosen procedures and classroom resources. The teacher can be a mediator in reflection with the aim of recapitulating and completing the task accomplished.

Therefore, the teacher can clarify the problem, set priorities, define specific objectives, and schedule a discussion/reflection of the group, list resources and criteria, to mention just a few activities of the teaching practice. In short, choices, decisions and action plan are occupied and assisted, from at least two considerations: those involving the entire classroom and those involving individual or peer-to-peer activities.

The cocktail is programmed from different situations (real or simulated); from the idea of learning to learn, from a particular content and from think tanks around an objective that involves important modifications in the "know-how". It should be noted that the modifications to the curriculum and the conditions of organization of the activities do not have a definitive determination, nor imply a response of all or nothing, are purposeful, re-educational and intend to change adverse situations of participation and learning.

Programming activities should maintain a positive interdependence between peers and individuals: the teaching role can, through observations, detail capacities in the execution of actions and schedule actions of reflection/discussion in the face of a certain situation. Its accompaniment should reduce mechanisms that hinder the actions determined and the use of interpersonal skills if problems are to be solved, both personal and academy.

Resources incorporated into the activities will help explore, discover, and resolve. Everyone shares the know-how. Each student can be a facilitator in the activities: it is observed, analyzed, re-opened and procedures and skills can be restructured to make the usefulness in the activity evident and that with the idea that "there are small daily successes in each student."

## CONCLUSION

It is suggested that planning and programming frame its considerations from four philosophical dimensions: environmental optimization, empowerment, self-determination and psychological strengthening of students; it is about consolidating access and participation in schooling process.

Teaching and learning activities suggest modifications associated with how I will do, what will be done and how I will evaluate; it is a question of planning detailing such activities for promoting autonomy, creativity, reflection and learning to learn. The design of planning and programming, then, will allow to take advantage of the diversity of the students, develop support systems and the organization of pedagogical teaching resources

whether before, simultaneous and subsequent to the activities, that will be carried out by the students.

Cognition and metacognition are two and go together in the process of being and individual with complex thinking skills. They gather us and separate us; together they make the survival of the specie: the strategies are the instrument and the operative of the activities that can be used for all. They may be spontaneous or deliberated; planning / programming the class is good. They can also promote creativity, innovation and change in the classroom.

Cognition and metacognition strategies should be flexible and, if possible, determine the type of help to identify or attribute meaning to learning, or to detail certain activities; it is the link between teacher/student/content that delimits the strategy. The school project consolidates purposes, such as providing quality in educational processes. The central theme of this reflection is the nature of the relationship between cognition and metacognition in teaching/learning strategies to identify areas of opportunity in teaching activities and to be reflected in the educational letter of facts. Many considerations have been left out; it is necessary to improve the quality of teaching for students and improve the conditions of access and permanency in the educational system.

These reflections are the result of more than twenty years of teaching in higher education that is not only for bibliographic investigation, but also a reflection of teaching practice. It is necessary to carry out research on the development of more data of learning *{in situ}*. Therefore it is only a reflective beginning that can be shared.

## CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

## REFERENCES

- Aramburu CCMP (2013). Bitácoras a la orden. Consideraciones generales. Spanish Academic Editorial.
- Bransford JD, Brown AL, Cocking RR (2004). How people learn. Washington. National Academy Press.
- Bloom B (1956). Taxonomy of educational objectives. Vol. 1: Cognitive domain. New York: McKay 20(24):1.
- Das JP, Kar BCy, Parrilla (1998). Planificación cognitiva. Bases psicológicas de la conducta inteligente. Paidós. México.
- Pimienta J, Prieto JHP (2012). Estrategias de enseñanza-aprendizaje. México. Pearson educación.
- Pimienta J (2008). Constructivismo: estrategias para aprender a aprender. Tercera edición. Pearson. México. [http://files.desarrollocompetenciasdiversidad.webnode.mx/200000040-c3f07c4e77/Constructivismo%20Estrategias%20para%20Aprender%20a%20Aprender%20\(Julio%20Pimienta\)%20\(1\).pdf](http://files.desarrollocompetenciasdiversidad.webnode.mx/200000040-c3f07c4e77/Constructivismo%20Estrategias%20para%20Aprender%20a%20Aprender%20(Julio%20Pimienta)%20(1).pdf).
- Rogoff 1918). Schooling and developments skills in T: E: (Ed. The contest of school based literacy. N.Y. Random House.
- Russell LA (1979). Redesigning the future. Ed. Limusa. Mexico.
- Swart JR, Costa LA, Beyer KB, Reagan RY, Kelleck B (2017). Aprendizaje basado en el pensamiento. Cómo desarrollar en los alumnos competencias del siglo XX. Ediciones SM. España. <https://aprenderapensar.net/wp-content/uploads/2013/05/Elaprendizaj-basadoenelpensamiento.pdf>.
- Klinger C, Vadillo G (1997). Cognitive psychology. Strategies in teaching practice. Mc GrawHill. Mexico.
- Secretariat of Public Education (SEP) (2019) Plans and curricula. Mexico.