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Using Problem-Solving as a Method for the Development of Self-Regulation of Learning with Adolescents: An Experience Report

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Abstract

The tendency to take risks without measuring consequences properly and the decrease in motivation are features presented at adolescence that may presuppose the need for changes in the traditional way of teaching and learning. This hypothesis leads to the search for educational solutions for a more effective work in the classroom. This study analyzes the methodology applied to adolescents at Sesi School, a basic education school in Southern Brazil, using Robert Sternberg's theory of problem-solving (2010) in cognitive psychology and Barry Zimmerman's concept of self-regulation of learning (1989). The analysis aims to draw relationships between the adolescence phase and the impact of a methodology focused on problem-solving, in order to perceive possible contributions to the development of more autonomy and responsibility for learning. This experience report points out as main contributions: (a) problem-solving can be a promising method for the development of autonomy and responsibility for learning; (b) as adolescents are moved by risks, problems can turn into challenges, motivating students to seek pleasure and reward in the search for the best solution; (c) problem-solving in the adolescents' formal learning environment promotes the development of a repertoire of strategies, which effectively helps with the autonomous and responsible management of learning regulation.

Keywords: adolescence, self-regulation of learning, problem-solving, learning autonomy, responsibility for one's own learning

1. Introduction

School has become responsible for disseminating elaborated culture and encouraging the construction of knowledge, making learning a constant. It is understood that acting in the field of education requires student learning outcomes. However, there is no single, external formula that addresses the problem [1]. What is known is that learning needs to be seen as an activity that students do to themselves proactively, rather than as a reaction to teaching [2].

According to Zimmerman [2], "a major function of education is the development of lifelong learning skills." Therefore, responsibility and autonomy are two essential aspects. It is common to find students who like to be told what to do or do it only if it is essential to a good grade. These attitudes diminish confidence in their own actions and depress the use of strategies to promote learning [3]. Learning needs involve the use of specific strategies to achieve academic goals [4]. And these actions come from research and development of problem-solving, coupled with the motivation to achieve solid results.

Cognitive psychology brings problem-solving as a motivated activity to reach a goal or answer a question [5]. And this will be the work front for the analysis of this study, which has as guiding element the methodology of teaching and applied learning for adolescents in high school at Sesi School network in the State of Paraná. The objective of the study is to relate aspects of Sesi's methodology to the theoretical notes referring to the problem-solving of Sternberg [5] and the self-regulation of learning in the vision of author Barry Zimmerman, both guided by cognitive and socio-cognitive psychology.

2. Facing the challenge: the cycle of problem-solving by adolescent students in a learning workshop

The ability to learn is a result of the need for our genes to make predictions in very unpredictable environments. The brain is built by these genes, with the ability to make decisions to ensure the survival of the individual. Decision-making is provided by strategies for learning and simulation of future events, enabling the execution of action plans [6].

Learning, therefore, is associated with the need for survival of genes and therefore needs a motive and situations that involve the development of this need, considered a "trick" to guarantee the art of living [6]. In the earliest times, this need was focused on acquiring the skills to hunt, procreate, and defend clan members and aspects formed by genes and executed by the brain. The brain is able to evolve over time because of the association of gene propagation with lived experiences, allowing for new connections and the development of subjective awareness, simulation capacity, and the innate movement of learning. Patterns of behavior are also tied to this evolution, spreading species selfishness and altruism to members from the same clan.

School learning, an aspect created from society's need, is, in this sense, a set of strategies to be acquired in order to live and survive in a given time, in accordance with the current standards and rules. If we take into account the current time that we live, autonomy and responsibility continue being essential elements for human survival. According to Zimmerman and Cleary [7], it is necessary to offer (to individuals) sufficient opportunities to develop and exercise their autonomy within the classroom. For this, mechanisms opposed to the traditional form of teaching need to be thought and applied. The development of the individual capable of managing one's own knowledge depends on how he or she faces the acquisition of new information. And today, with the demand for inclusion in an increasingly complex society, changes in the work world are increasing, requiring the formation of people capable of exercising effective strategies in problem-solving.

Sesi School network in Paraná has in its methodology the premise that the only way to do this is to break the paradigm of the traditional school as a response to social demands and to the industry. Its teaching and learning proposal is based on the participative education of the adolescent, and it focuses on developing the learning workshops. One of its main objectives is the education of leaders capable

of efficiently using their cognitive and relational capacities for success in the labor market. Learning workshops provide the constant investigation and exploration of challenges related to reality, providing a continuous conflict and the use of a range of strategies to achieve possible responses.

If this is the goal of the methodology, is it possible to work on these aspects in high school, a time when students are in their teens, where the individual undergoes important physiological and psychological changes?

Analyzing the perspective of neuroscience, research reveals that the extensive structural and functional development of the brain continues during adolescence, which means that there is still great flexibility for adjustments in intrinsic motivation and goal priorities, allowing for changes in their social context [8]. It is considered a period of development and consolidation of its social being and its identity and understanding of society and the opinion of others [9]. They also develop the capacity to retain larger multidimensional concepts and, therefore, acquire the ability to reason more strategically [10].

However, because of the hormonal changes, mainly due to puberty, the risk propensity becomes greater, because the individual loses up to 30% of dopaminergic synapses, strictly related to pleasure or reward. It is for this reason that certain situations considered pleasant during childhood are no longer interesting [11]. This lack of interest and the need for more robust rewards are related to changes in the adolescent's own brain that during puberty undergo a process of synaptic reorganization, and as a consequence, the brain becomes more sensitive to new experiences linked to executive functions and social cognition [10]. This means that, because of this reorganization, there is a greater need to search for sensations that bring back the sensation of pleasure and reward, and, therefore, there is vulnerability to risks.

Sternberg [5] points out that, although these manifestations derive from biological aspects, one of the factors that increase the risk activity, especially in negative risks, is the strong influence of the environment in which the adolescent is inserted. For the author, there are few hormonal effects that are not conditioned to the environment and that to contribute to the healthy development of the individual's brain at this stage, efforts to prevent or minimize negative risks should focus on changing the environment, transforming what the adolescents know and the ways they think. They are able to put energy into both analytical and heuristic processes for judgment and decision-making when immersed in contexts that activate their social schemas [12].

Positive influences in helping to develop greater autonomy and responsibility in the environment are therefore possible because the flexibility and the myelin layer formed in the axon of their neurons increase the speed of the electrical transmissions from one neuron to another, contributing to the maturation of the frontal cortex, a fundamental part for problem-solving and decision-making [10, 13].

In this sense, if we assume that the adolescent has a decrease in dopamine— responsible for pleasure and feeling of reward, resulting in a greater propensity for risk—but presents great potential for thinking strategically, making larger and faster neural connections due to the myelin layer, it is possible to consider work with problem-solving as a lever of autonomy and responsibility. Problems can become challenges and can be thought-provoking to the point of becoming a positive risk, motivating the student to seek pleasure and reward in finding the best resolution, resulting in knowledge.

In this context, the conventional teaching methodology worked as current education does, in a way, does not provide for the adolescent's need to cope with changes in his body and mind, and therefore does not fulfill his potential to utilize his neural and motivational capacity for learning. Therefore, the proposal of a new educational formation for the adolescence phase becomes real from the

neuroscience explanation, impelling adaptations to the new time, as affirmed by Silva [14]: "Students should be taught to understand and use personal resources that allow them to reflect on their actions, to exercise a greater control over their own learning processes and to strengthen their learning skills; teachers, on the other hand, should be able to stimulate in their students a more competent, efficient and motivated use of the learning processes and the technological and cultural means to which they can have access." It is the conscious, knowledgeable, and controlled possession of these internal and external means that can lead students to play an active role in the construction of their knowledge, in the fulfillment of their aspirations, in the elaboration and direction of their intellectual, affective, social, and professional goals and guarantee them an active and responsible integration in the society.

Academic learning, when based on the understanding of learning itself and on the construction of greater cognitive, metacognitive, and behavioral independence, favors the autonomous development of the individual and assists in the continuity of his/her formation after the school period [15]. It is assumed, therefore, that the role of the school is to provide the students with subsidies that allow them to develop cognitive, metacognitive, and behavioral mechanisms to help them to seek knowledge to improve and face the obstacles encountered in the course of their learning, even when, and especially in the absence of a mentor. "[...] the educational process must be based not so much on the transmission of knowledge and information, but rather on guiding and facilitating the formation of thinking and the action of the citizen" [16].

Dawkins [6] warns to the fact that "[...] it is a fallacy to assume that genetically inherited traits are by definition fixed and unalterable." What makes us autonomous is the ability to stimulate and exercise the brain to learn and contribute to the environment. In addition, the human being is directly influenced by culture and transmission of habits.

The methodology of the learning workshops has as one of its pillars the individual's independence, able to solve conflicts and problems in an intelligent and effective way. Studies show that synaptic reorganization promotes a decrease in synapses to give rise to a specialization of areas and abilities in adolescents [11]. This exercise in the brain is considered fundamental for the refinement of functional networks in the brain tissue, making neural circuits more efficient and prone to strategic work. In addition, this refinement also allows for the perception of the other, a crucial aspect for social communication [10].

In order for the adolescent to be able to put his or her areas and skills into practice, also by exercising this communication, contributing to problem-solving, the classrooms do not include individual desks, but tables with seats for 4–5 students, so that they can work the challenge of the team workshop, promoting discussion, reflection, and decision-making. This proposal is in line with Sternberg's [5] statements, reporting that for cognitive psychology, group work facilitates problem-solving as members can contribute with a greater variety of skills by sharing acquired skills. Moreover, interactions with peers, as well as societal influences, are likely to influence their social behavior, contributing to neural maturation in positive situations and contexts [9].

Solving the challenge proposed in the workshop, students have a period of a 2-month period to complete it, that is, the answer is not tied to the simple memorization of certain content. Problems require time, not opening space for immediate answers, but rather hypotheses [5]. It is expected that the executive function of the adolescent brain develops, providing better selective attention and decision-making [10], and for this reason, work with problems helps in the exercise of this brain function. According to Sartorio [11], "If we confront adolescents with problem situations that require from themselves the execution of moral decisions,

of anticipation of damages caused by acts and in the adequate recognition and judgment of the emotions, we will be propitiating maturation of the areas of the brain responsible for these abilities, thus increasing the chances of being cooperative, empathic, and emotionally healthy adults."

Working with problem situations—challenges—is part of a cycle that is composed of well-defined steps and, according to neuroscience, activates the prefrontal lobe each time we come across it [5]. "The brain is not only in charge of the continuous control of the occupations of survival machines but also acquired the ability to see the future and act accordingly," having the power to instantly decide what to do, increasing its efficiency in the various ways of living [6]. The decisions are thought from the strategy of simulation developed by the human brain itself and potentiated by the experiences lived by the individual.

The steps in the cycle to work with problem situations, which help and improve the decision-making performed by the brain, are clear in the Sesi/PR teaching proposal, as shown in **Table 1**.

There is a relationship between the Sternberg cycle [5] and the so-called self-regulatory learning skills, since, according to Zimmerman and Cleary [7], in order for students to solve school problems and meet expectations, they need to have a repertoire of strategies of study and self-regulation that they can access and use. Self-regulation is understood as a complex, multifaceted process that integrates key

Problem-solving cycle [5]	Sesi/PR School teaching proposal
1. Problem identification: first and important step to recognize the goal to be reached	The pedagogical team elaborates the projects to be implemented, each one with a challenge to be solved. The students identify what the challenge is and how the goal will be met. Thus, they choose which challenge they feel motivated to solve during the 2-month period
2. Problem definition: define it and represent it to understand how to solve it	By entering the chosen learning workshop, the facilitator teachers help the teams to understand the challenge and represent it
3. Elaborating a strategy for solving the problem: plan ways to solve it	During the workshop period, the student team is motivated to think of strategies to meet the challenge proposed. These strategies come from the experience with teammates, the facilitator teacher, and the resources available for research
4. Organizing information on a problem: to integrate the necessary information for meeting the challenge	Each learning workshop includes a content web related to the theme and the proposed challenge. The contents come from an area/subject proposed in the National Common Basis of contents for the Brazilian High School. History, geography, mathematics, biology, etc. are intertwined by the challenge. The students gather what they learn in the given subjects to achieve the desired goal
5. Resource allocation: the use of time, space, materials, and knowledge	It is necessary to have the time, the mental resources, and the help of the facilitating teacher, of colleagues, and of the didactic material available so that the planning and the applied strategies have effectiveness in solving the problem
6. Monitoring: measuring and evaluating the taken steps during the course	The students take up and evaluate the challenge at all times, being in individual works, being in works with their team. Through this review, it is possible to understand if the path mapped to the challenge solution is being effective
7. Evaluation: evaluate the solution after being concluded	The process of investigation and resolution of the challenge is evaluated by the student himself not only on the day of his presentation but also in his moment of reflection and decision-making: individual and team self-assessment. And through this activity, the student becomes aware of the steps taken and their performance so that the process is completed

Table 1.
Identification of Sternberg [5] problem-solving cycle in the methodology of Sesi/PR School.

motivational variables and self-processes. Self-regulation involves students who direct their behavior or strategies proactively to achieve self-established goals. They also rely on affective, cognitive, motivational, and behavioral feedback to modify or adjust their strategies and behaviors when they are unable, in the beginning, to achieve their goals [7].

According to Albert and Steinberg [12], a self-regulatory competence has high potential for negative risk decline by adolescents. Metacognitive activities are also placed as strong allies for processing and monitoring abilities of adolescent cognitive activities [10]. Unfortunately, students not only have a poor knowledge basis in effective strategies but also do not understand how to select, evaluate, and adjust faulty strategies. For the authors, it is important to create classrooms for problem-solving by incorporating principles of self-regulation of learning in daily activities, optimizing the time factor to promote greater cognitive evolution. According to Dawkins [6], the time factor is an object of strong competition in society because the human brain cannot do more than one or more than a few things at a time. Therefore, working with learning strategies in school becomes essential when it comes to ensuring survival and contribution to society.

Students at Sesi School must constantly exercise self-regulation capacity, controlling the use of personal, behavioral, and environmental strategies [2]. The autonomy and the responsibility for learning are structuring axes of the students' learning [17, 18]. And these axes are strictly linked to problem-solving. That is, in order for the learning workshop's challenge to be unraveled and unveiled, the problem-solving cycle and self-regulation capacity must be well adjusted, which is no easy task.

The first step of the cycle, besides demanding the identification of the problem/ challenge, is also affected by the generated motivation [5]. According to the author, our emotions can influence how we solve problems, sometimes harming the course. Extrinsic motivation must be strong to the point where, during the process, it has to be reverted to intrinsic motivation. Bzuneck [19] states that with the help of facilitators, extrinsic motivation can be changed, gradually, to intrinsic motivation. In research investigation of extrinsic motivation by external regulation, Bzuneck and Guimarães [20] affirm that there is a tendency, by students, to avoid the challenges, to lose initiative and to worry more about the completion of a certain task than with their quality, conferring the possibility of a certain type of reward or punishment for their (non) compliance. Adolescents are led to seek more extreme incentives to compensate for the brain's low motivational circuit [10]. Therefore, it is important to instigate the student to build the skills necessary to accomplish positive assignments. Intrinsic motivation facilitates and increases the chances that the problem will be solved.

According to Schneider [21], although children do not effectively monitor the use of strategies, they can be trained to do so by developing mechanisms that are extended to adolescence and adulthood. The adolescent's cognitive capacity for learning self-regulation develops gradually in a linear fashion, responding better to reward than to punitive feedback, helping him to support long-term goals [12]. In the classroom, the teacher has a potential impact to develop monitoring and control processes by students of their own learning [21]. The elaboration of strategies and the organization of information are embedded in the actions implemented by the students in the classrooms of Sesi/PR School. The facilitating teacher, working with one of the contents from the web in the learning workshop, launches a study roadmap for the student and his or her team to conduct research before discussing with the class. In the midst of activities, the use of heuristic calls (mental shortcuts) becomes frequent. According to Sternberg [5], heuristics are implemented due to the limits of our working memory. The solution of problems

depends on these mental shortcuts so that a solution can be reached. The student team needs to develop certain shortcuts related to the organization of space and time, action planning, volitional strategies, and even interpersonal relationships so that the team can do the job in the best possible way. Whether they are isomorphic problems, well or poorly defined, the provision of strategies becomes necessary.

The strategies that benefit self-regulation are based on four levels: behavioral, referring to the control of study time, organization of the environment to favor concentration and better use, materials and internal and external resources, seeking help from colleagues, teachers, or parents; metacognitive, involving perception of the role of cognitive strategies in the actions performed, knowledge of when, where, and how to use them, reflection of the objectives of the tasks and the planning to be carried out, monitoring the implementation of the plan, verification of results, and recognition of difficulties and of the strengths for conducting a new plan; motivational, encompassing understanding of what drives them to learning; and, finally, volitional control, referring to the development of strategies that help them with negative failures and feelings, better controlling attention and time, as well as demotivation, and better managing the resources and the assistance received [14].

The use of the strategies promotes greater awareness of the evolution itself so that the students reach the established goals, improving their school performance at all levels of the schooling process. The use of learning strategies, although still in an initial phase, can contribute to reduce problems found in the educational environment [22].

Conflict at Sesi/PR School classroom is natural. Therefore, sometimes the intervention of the facilitating teacher and the pedagogical advisor is fundamental. At meetings to discuss team performance, the coach usually asks members to reflect on how the team's skills are and the pace of response to the challenge. Then, from the answers, he builds, along with the members, strategies favorable to the growth and success of the team in the accomplishment of their tasks. This is necessary since the challenges of learning workshops, according to Sternberg's theory [5], are considered to be poorly structured, that is, there are no clear and readily available pathways to the solution, and, this way, depend on (a) knowledge of the domain, (b) skills, (c) cognitive and emotional factors, and (d) attitudes toward science and the regulation of knowledge. If the team does not elaborate and does not use effective strategies, the process of solving the team's problem and even the workshop challenge falls apart.

Teachers have a determining role for the final quality of the work performed [23]. The figure of the teacher as mediator, at the Sesi/PR proposal, comes precisely to mediate the process between creating their own action mechanisms and responding to the challenge.

3. The team facing the challenge: obstacles and the expert's role at Sesi/ PR School's methodology

For Sternberg [5], factors such as mental configuration or entrenchment can hinder the solution of problems. If the work team fixes on a specific strategy and, seeing the failure in the result, does not modify its strategy, the goal cannot be achieved. This is why experience in constantly exercising the brain to solve challenges prevents the individual from allowing functional fixation, which is nothing more than being unable to understand something by having only one way of seeing it to trigger in a certain situation [5].

For Rigon [24], the precursor of the methodology at Sesi/PR School, doing is the basis of the learning workshop, and arguing is one of the most important skills sought for the acquisition of experience in solving challenges. For the educator, formulating hypotheses, testing, analyzing, and formulating the rule are not only actions of mathematics or philosophy. They serve for any science—it is thorough knowledge. Therefore, it can be said that the methodology opposes functional fixation as an obstacle to solving problems, corroborating the efficient work with the challenge presented and, consequently, with the mission used by the school: "Forming leaders with social and environmental responsibility, with high level of negotiation, respectful and committed to cultural diversity and prepared to work in quality teams, leading them to be creative, ethical and innovative professional entrepreneurs and thus, face and win life challenges" [24].

The mission presented is complex, demanding, and instigating. It demands regulatory and self-regulatory efforts committed to learning. According to Rosário [23], self-regulating students of their learning see the events in school as opportunities to expand their experiences, valuing them. This becomes important insofar as these experiences lived and worked through strategies and can support the others that will come after the school period. For the author, "this process assumes 'skill & will,' that is, the application of cognitive and motivational resources to the concrete task of learning. [The strategies] should be trained on distinct types of school tasks to facilitate their transfer to other contexts, since students do not focus learning tasks in a similar way regardless of the contexts and nature of the learning tasks."

In cognitive psychology, Sternberg [5] defines "transfer" as the use of knowledge and/or skills from one situation to another, which can be of two types: the negative and the positive. The positive is the one brought by the author Rosário, which occurs when "[...] the solution of a previous problem makes it easier to solve a new problem, that is, the transference of a mental posture can help in solving problems" [5]. And this is also the one sought in the methodology of Sesi/PR School, when it proposes a learning workshop at each 2-month period. With each new workshop, students have the opportunity to practice the positive transfer in accordance with the experiences lived in the previous workshop.

Sternberg [5] states that an effective strategy to avoid negative transfer is incubation. This action promotes small pauses between the steps from the problem-solving cycle to promote conscious reflection of the problem. For the author, the incubation process allows new stimuli to activate new perspectives, promote the perception of analogy, and aid in mind relaxation to develop assertive attempts.

Another strategy considered effective by Sternberg [5] is the formation of a plan of action to solve the problem, working the prefrontal cortex. Planning also appears as one of the components of Zimmerman's self-regulation cycle [2], the so-called preliminary phase, which consists of analyzing the problem encountered in developing a plan that favors the achievement of the stipulated goal. In the methodology of Sesi/PR School, planning is one of the elements of the challenge resolution (**Figure 1**).

However, the ability to solve problems does not come only from planning or aspects already mentioned in this study. For Sternberg [5], knowledge is also a key factor in the process. For this reason, effective problem-solvers are called experts,
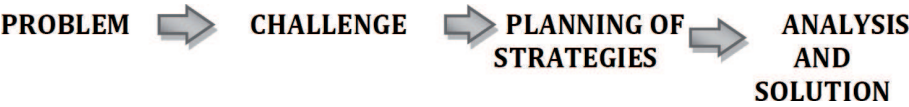
PROBLEM ⇒ CHALLENGE ⇒ PLANNING OF STRATEGIES ⇒ ANALYSIS AND SOLUTION

Figure 1.
Elements of resolution of the challenge from the learning workshop [24].

that is, they have "[...] superior skills or achievements that reflect a well-developed and well-organized knowledge basis" [5]. Experts are able to devote more time to planning and organizing the problem and less time in implementing strategies to solve it. They also have "automation" to develop strategic steps transferred from previous experiences, prediction of certain events, and flexibility during the process.

However, to become an expert, one must practice, experiment, and experience. Practice and living should focus on the acquisition of new skills, not repetition without purpose [5]. For Rigon [24], a school must be the place of doing and not the simple "decorating" of disconnected and meaningless content for real life. That is, why the author, referring to the methodology of the learning workshops, affirms that the integration of knowledge is done through transdisciplinarity and that this should be the form of content approach in school, intertwined by the proposed challenge.

Living and non-alienated experience activate the development of creativity, an important complementary aspect to problem-solving [5]. According to the author, creativity is the process by which something original is produced and that is also valid. It is creative who is an expert, who practices self-regulation and exercises the intrinsic motivation to reach his goals. "[...] Take advantage of what they know and diverge from knowledge to create innovative methods and products" [5].

For Rigon [24], education serves to assist in the process of changing a society, to develop potentialities. Therefore, it is not linear. It can be said, therefore, that education, in the methodological vision of Sesi/PR School, also depends on the development of the creative process, which facilitates the use of previous experiences, mobilizes strategic planning, and promotes innovative solutions. Creativity, therefore, is one of the guiding principles of problem-solving. Perhaps, it would be bold to say that it is developed by and moves the cycle proposed by Sternberg [5].

4. Conclusion

Learning arises from the need for our genes to make predictions in unpredictable environments so they can survive in today's society. And that is why learning requires a motive and situations that involve its development. Autonomy and responsibility in learning demand experiment and experience of conflicts, challenges, and goals to be achieved that do not have to wait for the adult stage to be exercised. The more time we spend to develop problem-solving strategies, the more effective experts we will be to exercise the knowledge and skills most effectively acquired.

Problem-solving work in school can potentiate this development, especially in adolescence, as it becomes a challenge that drives the learner's motivational and neural capacity to learn. The phase of adolescence encompasses physiological and psychological changes that are directly influenced by the environment. The need to take greater risks to satiate the search for pleasure and reward can be positively influenced by the practice and experience of metacognitive activities strongly associated with the development of self-regulatory skills, helping in the decline of negative risk and potentiating subsidies for the development of cognitive mechanisms.

Therefore, here are recommendations that can guide research and practice at enhancing adolescents' learning experiences:

1. School's curriculum: for most countries, schools have to follow an established curriculum with compulsory contents and subjects. How to make learning meaningful if the school has to make students study the curriculum in order to

conclude basic education? Organizing it into learning aims and skills students need to achieve by the end of the school year is the first step to create a more meaningful curriculum. Most documents point out only isolated contents which do not explain why it would be useful to learn them. By having learning aims and skills as its main pillars, the pedagogical team can then organize clusters according to areas of interest (environment, citizenship, technology, etc.), and not fragmented subjects. These clusters will be the background for proposing themes that will raise students' interest toward learning.

2. Methodology: the school is an extension of the adolescent's life. Therefore, it should promote different experiences to help them learn how to think of alternatives, solve situations, collaborate, know how to deal with frustration, learn how to search for answers, become proactive, exercise creativity, develop socioemotional skills, and use risk taking to contribute to a more productive environment. A problem-solving methodology is an appropriate approach as it influences students to act in order to learn. It touches their willingness to "survive." For this reason, (a) the curriculum organized by aims and clusters will help teachers to set big questions as challenges. Students will achieve the learning aims by seeking solutions for the challenge. (b) Protagonism: they should be able to choose what challenge to work on. This will give them power to work on what interests them and have more responsibility toward what they choose and what they need to learn is not imposed. (c) Infrastructure: spaces in the school should be tools to influence experiences. Furniture in the classroom should be planned in a way to make students work in teams, collaborate, use materials to help them work on the challenge, debate, search, etc. (d) Regulation of learning: students need to be assessed using the learning aims from the curriculum and in different perspectives. They should also be challenged to self-evaluate themselves in order to perceive progress and gaps they should work on. Technology can be a great ally to teachers in order to personalize what each student needs to focus more on. Simple questions at the end of the lesson, or making the learning aims available at the beginning of the term, or teaching study techniques can help students perceive their own learning and become more effective in focusing on overcoming their difficulties or improving their strengths. More research on possible methods regarding the student-centered field could be run in order to find more alternatives to enhance adolescents' self-regulation skills.

3. Teacher's role: for a student-centered methodology, teachers need to work as facilitators. They need to learn strategies to activate students' willingness to "survive" and, therefore, learn more and better. This will develop their autonomy to seek for answers, to collaborate more and to learn from their mistakes. Teachers are no longer information owners (which can be found anywhere with the spread of the Internet): their job is much more complex than that. Their job is to teach strategies to help students become more self-regulated. Therefore, it is of great importance to work on research that tests different strategies by the teachers in the classroom and identify which ones can be effective for adolescents.

4. School's role: the school's environment is also a focus when self-regulated learning is the goal. It should engage adolescents in activities in which they can either suggest or show contributions of their own. Social work, sports, students' council, students' school band, and book club are some examples of engaging activities that could help students practice their responsibility and

autonomy. Parents' activities, such as parents' school with workshops and lectures on how to potentiate adolescents' protagonism, can also be an important tool to help families work with them outside school.

The present study had the intention to analyze the methodology of Sesi/PR School from the point of view of solving Sternberg's problems [5] in cognitive psychology and learning self-regulation. The brief analysis showed important comparisons and convergences, a relationship between the theory, and an education proposal that shows the concern to develop more autonomous and responsible adolescents through the resolution of problems, promoting greater meaning for effective learning. More deep research on analyzing specific strategies from this article toward enhancing adolescents' independent learning is recommended to be conducted in order to both raise the importance of a self-centered approach in the classroom and guide teacher training with the most effective tools.

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