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Learning and its relation to human development in primary classes: contributions of the Zankov's System

A aprendizagem e sua relação com o desenvolvimento humano no ensino fundamental: contribuições do Sistema Zankov

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ABSTRACT[3]
Different developmental didactic systems gained prominence from 1950 onwards in the Post-Soviet states, based on the dialectic relationship between learning and development signaled by Lev Vygotsky and his collaborators. This text aims to present the fundamentals of the Zankov System, with emphasis on the pedagogical work aimed at the zone of possible development in the context of elementary education. This system is the synthesis of different theoretical and empirical research carried out by Zankov and his research group, which allowed the understanding of a concrete method for educational processes in primary grades. In

RESUMO
Diferentes sistemas didáticos desenvolvimentais ganharam destaque a partir de 1950 nos países da antiga União Soviética, baseados na relação dialética entre aprendizagem e desenvolvimento sinalizada por Lev Vigotski e seus colaboradores. O presente texto objetiva apresentar os fundamentos do Sistema Zankov, com destaque para o trabalho pedagógico voltado a zona de desenvolvimento possível no contexto do ensino fundamental. Este sistema é a síntese de diferentes pesquisas teóricas e empíricas realizadas por Zankov e seu grupo de pesquisa, o que permitiu a compreensão de um método concreto para os processos educativos em séries primárias. Neste cenário, o trabalho

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[3] This text is based on an online lecture called "Creating the Zone of Proximal development in Primary Classes, this was according to Zankov's System", given by the Professor Liudmila Grigorievna Guseva, that happened on November 5th, 2021. This international activity was promoted by GEPEDI (Study and Research Group on Developmental Didactics) from Federal University of Uberlandia, Brazil, for undergraduate and graduate students in psychology, pedagogy and other degrees, basic education and higher education teachers, education professionals and related areas. This lecture and others about developmental didactics and historical-cultural psychology are available for free in: https://www.youtube.com/live/S_JBpnt0VfY?feature=share.

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this scenario, the work of teachers is based on five inseparable principles: teaching at an optimal level of difficulty, emphasizing theoretical knowledge, proceeding at a rapid pace, developing student's awareness of the learning process and the purposeful, systematic development of each student. These principles are presented throughout the text with examples from the teaching about mathematics and natural sciences. Finally, the pedagogical contribution of the Zankov System and its potential for different experiences in basic education are highlighted.

Keywords: Zankov System. Developmental didactics.

dos professores se sustenta em cinco princípios indissociáveis: ensino em um nível ótimo de dificuldade, ênfase no conhecimento teórico, proceder em ritmo acelerado, desenvolver a consciência do aluno sobre o processo de aprendizagem e o desenvolvimento intencional e sistemático de cada aluno. Esses princípios são apresentados ao longo do texto a partir de exemplos na área de matemática e ciências da natureza. Finalmente, destaca-se a contribuição pedagógica do Sistema Zankov e o seu potencial para diferentes experiências na educação básica.

Palavras-chave: Sistema Zankov. Didática desenvolvimental.

Leonid Zankov was born in 1901 and passed away in 1977. He was an Academician and a Doctor of Psychology. He was among the first and closest disciples of Lev Vygotsky. He was the first to test Vygotsky's theories by conducting experimental research in Russian elementary schools.

And what is that theory? New and exceptional concept that Lev Vygotsky proposes: Zone of Proximal Development. For him,

> ZPD - the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers (VIGOTSKI, 1978, p.200).

When Zankov decided to start that experiment at elementary school, checking how to create the zone of proximal development, to learn the relationship between learning and development, his aim was to determine the nature and degree of influence that teaching methods have on the general development of students in primary grades.

What does that mean: general development of school pupils? This is the move from the simple to the complex. The ascent from the lower to the higher. The climb along the ascending path. Also from the qualitatively old state to the qualitatively higher state. And it is the process of the renewal: the birth of the new and the withering away of the old.

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The development of various sides of a child's psyche, which according to traditional early Greek notions about the human psyche, are intellect, will and emotions. In his firsts books, Leonid Zankov wrote that it is the same as analyzing observation, abstract thinking and practical actions. However, it is not possible to separate them, since the three are related.

What does it mean that development of intellect and will are in the relationship? For Leonid Zankov, the development of intellect involves not only the acquisition of knowledge, but also various kinds of cognitive activities, such as logical thinking, observation, memory, and imagination. And this development is linked to the development of will, the ability to set goals and motivate oneself to achieve them. It will grow out of wishes and desires and develop as the child achieves her or his goals.

This is very important because during the teaching we must remember about the development of intellect and will, and about emotions. It is because teaching and learning involves all of the components of general development of the child. So, we need to remember about the development of all the components of the general development during the lessons and teaching.

About emotions: what kind of emotions? Intellectual (e.g. joy of learning, joy of exploring); ethic (e.g., gratitude, conscience, decency, allegiance to principles); aesthetic (e.g., understanding of harmony of colors, forms, sounds). Emotions enrich development, bringing life to new understanding. For example, when you are satisfied and you have joy of learning, then knowledge comes easier.

Analyzing all of this, the zone of proximal development and the components of general child's development, Zankov and his group (Laboratory) started the experiment. The first stage was in one single class in Moscow school from 1957 to 1961, and after that a new system was created. It's principles were defined and embodied in a concrete method for the process of instruction and upbringing during the primary grades. New programs, textbooks, methods, techniques and teaching had been created, from the Laboratory for Problems of Teaching and Development of School Pupils began broad experimentation in different republics and cities of Soviet Union.

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In Zankov's system there are five principles. They are like five fingers on one hand: if you miss just one, it is not convenient. So, it is very important to use all of the principles in everything that teacher and students are doing in class. Unfortunately, some teachers did not use all five principles, and this is why in several schools the System didn't work as effectively as it was created for.

The principles are:

1. Teaching at an optimal level of difficulty.
2. Emphasizing theoretical knowledge.
3. Proceeding at a rapid pace.
4. Developing student's awareness of the learning process.
5. The purposeful, systematic development of each student.

What does it mean: teaching at an optimal level of difficulty? That means that some children can get over a new activity with the teacher's help or other students' help. Why do we need that? To explain that, it's possible to compare with the sportsman: for them, to build the muscles, they have to train and it is not an easy task, they are working hard physically. So, for our brain is the same: we must do some exercises too.

Students' development will move slowly unless learning includes overcoming difficulties that create mental tension. It's very important. All of us can remember that joy when we were solving mathematical problems and overcame the difficulties. These are the emotions, the joy of learning. Overcoming difficulties in the zone of proximal development strengthens students' beliefs in their own abilities.

For example, in math. In that example all 5 principles are easy to see: they are combined, in a complex way. Here, students have to resolve 2+1, and then, 2 + 1 +1, and then they have to compare 2 + 2, analyze and make a conclusion: 1 + 1 = 2. Here, we have three principles combined, because children need to remember about the previous knowledge to make a conclusion to learn something new.

Another problem is like that:

1. There were 28 flowers on a flowerbed. 11 flowers were cut to make a bouquet. How many flowers are left on the flowerbed?

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2. There were 17 flowers left on a flowerbed, after 11 flowers were cut to make a bouquet. How many flowers were on the bed?

And then, we ask children to compare these problems and tell what they notice, solve these problems, compare their solutions, and tell what they can say about them and how these solutions are related to each other and what this relation does depend on. So, after answering the last question, the teacher can say: those problems are inverse problems.

The next principle is emphasizing theoretical knowledge, and you can see when we were solving mathematical problems and made the conclusion that they were inverse problems. Children are very fond of research work. They like to discover connections and draw conclusions on the basis of their own observations.

It happens, for example, when students start to study about sugar, starch, and acids. Students are working in a group of 4. The goal of the experiment is to find out which product contains starch. Each group has a vial of Iodine tincture diluted with water, a pipette, and a container with a piece of apple, potato, and white bread. By dripping iodine from a pipette onto each food and observing the reactions children noticed that potatoes and white bread became purple or blue, but apple did not. The conclusion was made: potatoes and white bread contain starch.

Figure 1 – Photo of a moment in this activity about sugar, starch and acids.

Source: the authors.

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The next principle is the principle of proceeding at a rapid pace. A rapid pace of study in Zankov's system does not mean haste in learning or hurrying during classes. It is impossible to order a child's mind, "Grow faster!" The system is not meant to force development. The aim is to create favorable conditions for awakening and unfolding the learner's potential. Leonid Zankov often used the phrase: "hurrying without haste".

Previously learned material is reintroduced with a new content, allowing learners to observe the familiar in a new light even as they explore unfamiliar ground. Previous knowledge is integrated with what comes next and becomes synchronous with the learners' expanding pool of knowledge. Geometry is an important part of the mathematics curriculum and we use the game Tangram, which contains 7 geometric figures. Firstly, we discover how to construct a square, then an image of a house, plane, some animal, etc. Each image must include all 7 figures. Every week we do play with Tangram, and every time we ask children to compose a new picture that is more complicated than the previous one.

Figure 2 – Photo from an activity of geometry using Tangram.

Source: the authors.

The principle of developing a student's awareness of the learning process. This principle is directed inwards, toward student's awareness of the learning

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process taking place within them; an awareness of their prior knowledge and what now is being learned during the process of studying a certain subject, phenomenon, or story. This is very simple: students are learning about everything, and they need to use it in life, not just to learn and forget, but the knowledge that they are getting should help them in their lives.

Another example of activity was about pumpkins. Here we have all the principles together: research, learning something new in a new level, something that children can do in their zone of proximal development, and they are making conclusions, they are making presentations.

In this case, the students could see different types of pumpkins, and some pumpkins have funny shapes and different colors. So, the assignment for children was not just doing the presentation specifically regarding pumpkin. They had to make a story, a fairy tale, about funny forms and colors. The fantasy of children is amazing, they constructed really interesting stories.

After that research, presentation and stories about pumpkins, children did try porridge from pumpkin, cooked by a student's grandma. So, children can try how delicious pumpkin is and understand how good it is for health. Besides, they could try pumpkin salad.

About numismatics, children can bring money to the class and do a presentation. And then, next year, we would research about money: how money is made, how to protect and save money. So, every time we return to some subject, we learn something new. We are trying to show: how is the knowledge to be learned linked together? What are the various aspects of mastering spelling or computational operations? What is the mechanism underlying errors and the prevention of errors? These and many other questions relating to the mastery of knowledge and skills are the subject of students' unflagging attention.

The last principle is the principle of the purposeful, systematic development of each student. Zankov was against separating children by strong and not strong, because they can contribute to each other. Zankov's system accepts each child the way he or she is, with their own peculiarities

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and character. He believed in every child and their potential. All the teacher's activities in his system are directed toward the realization of students' intellectual potentials, and the development of their dispositions and inclinations.

El aprendizaje y su relación con el desarrollo humano en la escuela primaria: aportes del Sistema Zankov

RESUMEN
Distintos sistemas didácticos desarrolladores cobraron protagonismo a partir de 1950 en los países de la ex Unión Soviética, basados en la relación dialéctica entre aprendizaje y desarrollo señalada por Lev Vygotsky y sus colaboradores. Este texto tiene como objetivo presentar los fundamentos del Sistema Zankov, con énfasis en el trabajo pedagógico dirigido a la zona de posible desarrollo en el contexto de la educación básica. Este sistema es la síntesis de diferentes investigaciones teóricas y empíricas realizadas por Zankov y su grupo de investigación, que permitieron comprender un método concreto para los procesos educativos en los grados primarios. En este escenario, el trabajo de los docentes se basa en cinco principios indisociables: enseñar en un nivel óptimo de dificultad, énfasis en el conocimiento teórico, proceder a un ritmo acelerado, desarrollar en los estudiantes la conciencia del proceso de aprendizaje y el desarrollo intencional y sistemático de cada estudiante. Estos principios se presentan a lo largo del texto a partir de ejemplos en el área de las matemáticas y las ciencias naturales. Finalmente, se destaca el aporte pedagógico del Sistema Zankov y su potencial para diferentes experiencias en la educación básica.

Palabras clave: Sistema Zankov. Didáctica desarrolladora.

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[4] Considering that text was based in a lecture, most of citations was made in an indirect way. So, there are some recommended bibliographies about Zankov System, and we expect that can be an invite for more studies about developmental didactics.

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