

Research Article

# Interdisciplinary Research of the Fairy-tale as a Teaching Resource for Child Development: The Ukrainian Experience

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## Abstract

The actuality of the study stems from the imperatives of the new post-non-classical scientific paradigm, which presupposes unification of the scientific and mythological worldviews, when there is a need for theoretical interpretation of mythological ideas of humanity, and at the same time there is a need for using the mythological knowledge and metaphorical forms of their representation in scientific researches. At the same time, the mythological and metaphorical way of comprehending the world enables to bring together scientific ideas, find analogies and associations between different systems of concepts, thus acting as an epistemological access to complex/ambiguous concepts. Under such conditions, the fairy-tale being the metaphorical resource of human development finds actualization in modern psychological and pedagogical sciences, which studies the peculiarities of children's perception and understanding of fairy-tale content, which is considered as a means of upbringing and education, a special source of the formation of aesthetic feelings. Accordingly, the article outlines the main aspects of the fairy-tale not only as a developmental and upbringing, correctional and therapeutic means of influencing children, but also as a teaching tool that allows conceptualizing the new pedagogical direction associated with the development of teaching fairy-tales and the implementation of the appropriate methodological support for the teaching fairy-tale in the educational process of both preschool and primary education. Some Ukrainian folk fairy-tales are analysed in a scientific and methodical way. The concept of a teaching fairy-tale, providing a new paradigm of preschool education, outlines the fairy-tale as a means of teaching certain mathematical, physical, and philosophical aspects/data of reality. It is shown that the fairy-tale as the embodiment of analytical knowledge in a "folded" synthetic form is realized in the sphere of archetypal ideas of humanity, which can be transformed into scientific and theoretical meanings in the process of developing the child's personality. It is believed that the deeper a child immerses itself in the world of fairy-tales and the more spacious this world is, the more philosophical and scientific meanings, as well as mathematical and physical knowledge the child will be able to perceive, acquire, crystallize and operate with in the future.

## Keywords

Fairy-tale, Educational Resource, Upbringing, Diplasty, Pre-schooler, Child's Inner Language, Therapeutic Fairy-tales, Parable, Myth, Fable

## 1. Introduction

The spread of a new post-non-classical scientific paradigm of world cognition creates favourable conditions for devel-

oping a new pedagogical paradigm. One of the main aspects of the new scientific paradigm is realized in uniting the sci-

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**Received:** 3 February 2025; **Accepted:** 26 February 2025; **Published:** 24 May 2025



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entific and mythological worldviews, when, on the one hand, there is a need for theoretical interpretation of mythological ideas of humanity, and on the other hand, the use of mythological knowledge and metaphorical forms of their representation in scientific search has become very important. While the interpretation of myths is a procedure sufficiently developed in modern science, then the mythologizing of science is more characteristic of pseudoscience. However, science uses myths in the form of scientific paradigms/axioms (refer to K. Gödel's incompleteness theorem concerning the limits of provability in formal axiomatic theories), and the property of mythological, metaphorical reflection of reality is almost the only means to capture and meaningfully define objects of a high degree of abstraction. The mytho-metaphorical way of understanding the world enables to bring together scientific ideas, to find analogies and associations between different systems of concepts, acting as certain epistemological access to complex/ambiguous concepts [1, 2].

Thus, the cognition of the world presupposes the integration of scientific-theoretical and religious-mythological strategies of thinking and cognizing the Truth. The latter combines opposites and reveals *diplasty* (a psychological phenomenon consisting in integrating the two elements that simultaneously exclude each other) – a productive psychological mechanism of both a person's orientation in the world and a means of thinking, which is implemented in the context of a combination of incompatible aspects – image and idea, the concrete and the abstract, the objective and the subjective, etc.

## 2. Current State of the Issue

Under such conditions, the fairy-tale-metaphorical resource of human development is extremely actual in modern psychological and pedagogical science, which studies the peculiarities of children's perception and understanding of fairy-tale content, being considered as a means of upbringing, a special source of formation of the aesthetic feelings. A significant number of scientific papers are devoted to the methodology of studying fairy-tales. Modern authors study the influence of fairy-tales on children's speech development, as well as they use fairy-tales in speech therapy work, psychocorrectional work, in studying the peculiarities of fairy-tales' influencing the mental sphere of the pre-schoolers [3]. The fairy-tale as a means of development and upbringing of children is widely used by the scientists [4-8].

At the same time, the fairy-tale has been considered mainly as a developmental and educational/upbringing means, as well as correctional and therapeutic tool. The teaching resources of the fairy-tale, the use of which is aimed at the formation of logical-mathematical, philosophical, and physical knowledge in children, remain out of the attention of the scientists.

## 3. The Aim of the Research

Accordingly, the purpose of the article is to outline the main aspects of the fairy-tale not only as a developmental, educational/upbringing, correctional and therapeutic means of influencing children, but also as a teaching tool that created favourable condition for conceptualizing the new pedagogical direction connecting with the development of teaching fairy-tales and the corresponding methodological support for the implementation of the teaching fairy-tale in the educational/upbringing process.

## 4. Materials and Methods

Among the methods used in the interdisciplinary study we have used not only the methods of theoretical analysis of the problem field, but also the applied tools have been used – the concept of functional asymmetry of the human cerebral hemispheres, as well as the data of quantum/relative physics.

## 5. Results and Discussion

### 5.1. Traditional Use of the Fairy-tale in Educational and Social Systems

The fairy-tale is primarily used in the educational process as a means of developing child's personality and cultivating certain social/universal values that are formed in a child at the level of social and psychological attitudes and settings.

With the help of a fairy-tale, the children's thinking and speech are developed as well as their vocabulary is expanded. Children learn to ask questions, answer them, build a phrase, a sentence, and later – a whole dialogue. Thus, through a fairy-tale, children develops in mastering and comprehending the language. When reading a fairy-tale, one can find sayings and proverbs that help children to understand the meaning of a fairy-tale and develop their ability to perceive the polysemy of a word, its deep character.

Fairy-tales provide a child with a positive upbringing influence, prepare to distinguish between courage and cowardice, truth and lies, intelligence and stupidity. Thus, the intrinsic value of fairy-tales lies in their impact on the multifaceted development of child's personality. The fairy-tale texts instill in a child the confidence in the triumph of truth, the victory of good over evil. Temporary failures of positive fairy-tale's characters are the norm, and after that, as a rule, the joy comes as a result of common efforts of positive fairy-tale's characters [9].

The fairy-tale is also used as an art-therapeutic tool when working with children's emotional and behavioral disorders enabling the child to overcome its fears, anxiety. Fairy-tales also help children learn generally accepted moral and ethical norms and teach socially acceptable ways to express their own emotions as well as to correct negative traits [10].

Therapeutic fairy-tales can be differentiated due to the following issues: "1) Fairy tales for fearful children; 2) Fairy tales for aggressive children; 3) Fairy tales for hyperactive children; 4) Fairy tales focused on the settlement of family relations (for example, parental divorce, etc.); 5) Fairy tales focused on coping with difficulties in socialization; 6) Fairy tales aimed at preventing neurotic disorders; 7) Fairy tales aimed at supporting a child facing death; 8) Fairy tale aimed at solving problems with self-esteem; 9) Fairy tales for children of war" [11, 12].

There are several methods of working with a fairy-tale: telling, rewriting, composing new fairy-tales, their analysing, role-playing, drawing or making characters on their basis [13, 14].

Children, as a rule, cannot talk about their fears that underlie anxiety. In the process of discussing a fairy-tale and working with it through drawing or making characters, while reviving their fear and playing with it, the child understands that it can manage its fear itself: the child can be proposed to compose a story about its fear thus acting the fear out. After this the "fear" dolls or "fear" drawings can be destroyed. However, there are situations when the child has become friends with its doll, and the child does not want to part with the doll. Usually, this means that the original fear that formed the anxiety no longer scares the child [15].

Fairy-tales being an art-technology for correcting anxiety, fears, and self-doubt are also used in working with adults being the important factors for the correction of children's psychic problems. A fairy-tale can create a special, magical atmosphere thus calming and setting child's mood for the positive victorious behaviour, helping fight fears and other problems. Thanks to this, children reveal their potential personality, they feel protected, confident, and comfortable [16].

## 5.2. Fairy-tale Teaching Resources

The fairy-tale-metaphorical resource of a child's development is realized in psychological and pedagogical science and practice, which studies the peculiarities of children's perception and understanding of fairy-tale content. However, in modern educational theory and practice, the fairy tale is used mainly as a developmental and educational tool, with the help of which value orientations, the sphere of moral ideas about the world are formed in children, when fairy-tales also teach

ways of moral behaviour in the system of social relations.

The educational functions of the fairy-tale, associated with person's scientific and philosophical mastering the reality, are least developed in preschool pedagogy and are practically not realized in modern educational systems. While the teaching resource of fairy-tales is truly colossal, and its theoretical substantiation and wide application enables to implement a *new paradigm of preschool education* [3].

It is known that a person in the onto- and phylogenetic period of his/her early childhood reflects and masters the world mainly on the basis of the mechanisms of the right hemisphere of the brain, forming a mythological (magical, fairy-tale) reality, producing a holistic vision and understanding of the world and developing synthetic knowledge that operates with mythologemes, which, due to their scientific analysis, turn out to be mostly adequate to the objective state of affairs, revealing the phenomenon of "cognition before cognition."

That is, the language and content of the myth (within which the world appears as a holistic indivisible and paradoxical complex) can receive scientific interpretation at the level of mechanisms of perception and understanding of the world by the left hemisphere of the human brain. At the same time, the objects that exist syncretically within the myth and does not obey the classical linear principle of cause and effect, in the sphere of scientific understanding of the world can be represented as existing discretely and causally.

The integrity of the socio-natural world is realized in the unity of mythological views and scientific theory, which reveals the principle of cultural and historical continuity of the existence of humanity, whose knowledge of the world appears "existing from time immemorial" in a condensed associative-metaphorical mythological, *fairy-tale* forms, capable of transforming into scientific and theoretical schemes in the process of development of human society.

Therefore, we can talk about the special role of a fairy-tale as a reflection of mythological reality, which is an educational source of the development of humanity. This conclusion becomes clearer if we clarify the concept of functional asymmetry of the human cerebral hemispheres. The hemispheres represent a certain psychophysiological focus of the human organism, since the main aspects of the human being are directly or indirectly related to their functions [17-19].

In this regard, the peculiarities of hemispheric asymmetry are of immense significance (Table 1).

**Table 1.** Main philosophical, neuropsychological, psychological, psychophysiological features of hemispheric asymmetry [19].

RIGHT HEMISPHERE	LEFT HEMISPHERE
The strategies of cognition and mastering the world	
1) Visual and figurative, intuitive and creative, "continuous" thinking	1) Discrete and analytical, classifying and abstract, algorithmic and step-to-step, "discrete" thinking
2) Uncertain and polysemantic/ambiguous linguistic and motivation contexts of cognition and mastering the world	2) Accurate and monosemantic linguistic and motivation contexts of cognition and mastering the world

RIGHT HEMISPHERE	LEFT HEMISPHERE
3) The main result of such cognitive strategies: a holistic perception of the world when its opposite aspects (inner and outer, objective and subjective, whole and part, etc.) are represented in unity	3) The main results of such cognitive strategies: the formation of an internally consistent model of the world understanding that can be consolidated and unambiguously expressed in the words and signs
The peculiarities of incoming information processing	
Simultaneous and holistic processing of information on the basis of the first signalling system	Consecutive processing of information with the help of verbal-sign system with the involvement of facts data and logic operations, realized on the basis of the second signalling system.
Visual-spatial-time perception	
1) The right hemisphere distinguishes the faces if they differ not in one but in many features.	1) The left hemisphere differentiates the faces, if they differ only in one feature.
2) The right hemisphere is effective at distinguishing the curvature of lines, irregular shapes, polygons, the spatial arrangement of complex shapes, the depth in stereoscopic images.	2) The left hemisphere better distinguishes few clear details of the images.
3) The right integrates the elements in complex configurations.	3) The left prefers to break holistic images into parts, details, discrete elements.
4) The left vision field is the domain of the right hemispheric functions.	4) The right vision field is the domain of the left hemispheric functions.
5) The right hemisphere is oriented to the past time.	5) The left hemisphere is oriented to the future time.
The abilities and activities the hemispheres are directed at	
1) The right hemisphere realizes the ability to visual and tactile recognition of the objects.	1) The left hemisphere realizes speech activity thus working with verbal symbols.
2) The right hemisphere realizes the ability to music and drawing, distinguishing the voices and emotional states of interlocutors, expressing and conveying the emotions by voice intonation.	2) The left hemisphere realizes the ability to read, write, count, analyse, classify, establish cause-effect relationships between the objects and phenomena of the world.
3) The right hemisphere makes it possible for a man to navigate in space and have an accurate idea of his/her body in its movement.	3) The left hemisphere realizes the intelligent interpretation of human sensations, on the basis of which a certain line of behaviour is developed.
4) The right hemisphere realizes the ability to dream and fantasize.	4) The left hemisphere realizes the capacity to select the goals and predict the outcome of actions.
5) The right hemisphere is active in REM sleep when a person plunges in dreams and is unable to control their scenarios.	5) The left hemisphere is active in slow-wave sleep (deep sleep)
Types of perceived information	
Non-verbal, figurative, irrational.	Verbal, abstract, rational.
Sensory peculiarities	
1) The right hemisphere expresses the processes of first signalling system.	1) The left hemisphere expresses the processes of second signalling system.
2) The right hemisphere gives preference to hot colour spectrum.	2) The left hemisphere gives preference to cold colour spectrum.
3) The right hemisphere prefers to perceive tune.	3) The left hemisphere prefers to perceive rhythm.
4) The left part of human body is the domain of the right hemispheric functions.	4) The right part of human body is the domain of the left hemispheric functions

So, it is very important to take into account *the peculiarities of the perception of the world by the hemispheres in the educational process*. The holistic process of world cognition is carried out as a result of the interaction of operations performed by the hemispheres of the human brain. "However, the process of cognition becomes incomplete, or even impossible, not only when the connection between the cerebral hemispheres is disrupted as a result of illness or injury, but also

when the mentioned disruption occurs on a socio-psychological basis in the process of upbringing and teaching. Children's perception of the surrounding world is characterized by integrity. The child is accustomed to the formation in the right hemisphere of the image of the world in all its richness of geometric shapes, associations, colours, smells, sounds. In the left hemisphere, a kind of verbal framework of what is "reflected" in the right hemisphere is

created. Images are "inserted" into this framework-scheme, like pages in a book. In this way, the mechanism of long-term memory is realized. Violation of synchrony in the work of the two hemispheres is precisely associated with a violation of the proportions of "conscious – unconscious" or "rational – sensory" in the process of pedagogical influence on the learner. Therefore, the limits of the traditional educational systems, most often, from this point of view, are connected with an imbalance along the line "conscious – unconscious", "rational – sensual". Beyond this line, there is rapid fatigue of learners, misunderstanding and non-acceptance of new educational material, apathy towards learning" [20] (p. 118).

It should be noted that in the onto- and phylogenesis of a living being, there is a gradual increase in hemispheric asymmetry, the greatest expression of which is achieved in adulthood. Then the hemispheric asymmetry is gradually levelled due to which a state of functional synthesis of the hemispheres is realized, when an elderly person, enriched with life experience, in fact turns into a child with its plastic psyche and immediacy of perception of the world, expressing, to a certain extent, the acmeological ideal of human development.

Thus, human development proceeds from the right-hemisphere aspect of the psyche (in an infant, both hemispheres show the lowest index of asymmetry and function as a single whole mainly according to the principle of the right hemisphere) to the left-hemisphere, and from it to the state of functional synthesis of the hemispheres.

Under such conditions, the onto- and phylogenetic dynamics of the hemispheres realizes the movement from *the subconscious* (right hemispheric) to *the conscious* (left hemispheric) aspect of psychic activity, and from the latter – to their functional synthesis revealing *the superconscious* entity (V. Simonov) as a creative status of a person, which characterizes the state of unity of opposites, which at the level of mental reflection of reality is realized in the fundamental phenomenon – *the diplasty* – not characteristic of animals the fundamental ability of a human being to combine opposite things, concepts, psychophysiological states in one integral/paradoxical context.

If human development proceeds from the right hemisphere to the left, and from it to their functional synthesis, this means that socio-pedagogical influences and, in general, any information that is implemented at the level of the functions of the right hemisphere (in preschool and junior school age) are transformed into certain abstract-logical forms at the level of the functions of the left hemisphere (in senior school age and adulthood). Under such conditions, there is a gradual actualization of the right-hemispheric concrete-figurative information about the world (which prevails in preschool age) into the sphere of left-hemisphere processes (in middle and senior school age), when the concrete-figurative information is transformed into the abstract-logical information.

Thus, the fairy-tale and mythological content of education is tend to be transformed into a scientific-theoretical one, and,

therefore, the phenomenon of the functional continuity of the cerebral hemispheres implies the unity of myth and science, their mutual rotation, when myth can receive scientific interpretation/understanding, and science as it is can use "scientific myths" – certain scientific paradigms/dogmas (Thomas Kuhn).

In general, the history of mankind has proved that a fairy-tale, parable, epic, myth, fable and other means of metaphorical reflection of reality have been and are one of the most important cognitive tools for people to master a certain type of scientific culture, a kind of way of "entering" it, being the main mechanism of learning and upbringing at the initial stages of the development of human society. For a child who is at the initial stage of the development of the human personality, a mythological and epic picture of the world is also characteristic, which then develop in the line of the theoretical and pragmatic scientific schemes.

Due to a new paradigm of preschool education, the left-hemispheric verbal-logical thinking stems/grows from the polysemantic metaphorical right-hemispheric mastery of reality by a person. Under such conditions, the goal of human development is to achieve harmonious coordination of the right- and left-hemispheric aspects of the psyche, leading to their functional synthesis, when such phenomena that correlate with the functional nature of the hemispheres, as image and idea, concrete object and abstract sign, feeling and thought, the single and the plural, etc. are combined and unified, forming a psychological basis for intuitive, meditative-dialectical, creative, heuristic, paradoxical reflection of reality and its mastery, in the process of which the concrete and abstract, expressive and logical are integrated, giving rise to the phenomenon of authentic and true being.

It should be said that, as some scientists believe, the property of mythological reflection of reality is almost the only means to catch and meaningfully define the objects of high degree of abstraction. At the same time, adequate cognition of the world by a person involves the fusion of scientific (unambiguous, mainly left-hemispheric) and mythological (multiple-meaning, mainly right-hemispheric) types of understanding the world, and this forms authentic reality as Truth (which the Georgian logician S. Tsereteli defined as the "unity of opposites"), in the sphere of which opposites are integrated and diplasty is formed.

This conclusion is confirmed in the studies of the Ukrainian Academician O. Tretyak, whose experiments have shown that pupils and students better assimilate educational material constructed from the concepts that have simplified – "fuzzy" – semantic contours, which allows them to be combined into holistic semantic conglomerates, thus establishing logical connections between conceptually distant realities, theoretical objects, which corresponds to creative – fuzzy, dialectical, paradoxical, polysemantic, metaphorical, multidimensional, nonlinear – thinking and a way of cognizing and mastering the world.

The hemispheric synthesis involves the full unfold-



ing/realization of the resources of the "right", creative aspect of the psyche (the essence of which lies in the ability to think holistically, polysemantically, combining and integrating facts and realities belonging to different and even polar spheres of our world), and therefore the educationalists should not rush to replace the activity of the right hemisphere with the left one. Thus, the mind of a person in whom direct perception of the surrounding world and visual-figurative thinking were not properly formed in childhood may later receive one-sided development, acquiring an excessively abstracted mode. Some researchers believe that such purely one-sided left-hemispheric thinking leads to the formation of a schizoid type of person, characterized by an unambiguous "black and white" worldview.

Moreover, as E. Berne writes in the book *"Games People Play"*, it is in childhood that a certain "scenario" of a child's future adult life crystallizes. In this regard, it is important to note that *imprinting* as any kind of phase-sensitive learning that is rapid and apparently independent of the consequences of behaviour takes place precisely in the context of an affective situation, when the right "emotional" hemisphere of the human brain is active, in the functional plane of which a kind of coding of a person's future behaviour takes place through the prism of sensibility, visuality, imagination, which finds its most consistent reflection precisely in the fairy-tale and metaphorical way of comprehending and mastering the world by all the participants in the educational process.

*At the same time, the deeper a child immerses itself in the world of fairy-tales and the more pronounced this world is, the more scientific and theoretical meanings the child later is able to acquire, perceive, extract, and crystallize.*

The scientific and philosophical resource of fairy-tales becomes clear through their interpretation. Let us give some examples. In the Ukrainian folk fairy-tales *"The Turnip"* (<https://naurok.com.ua/fairy-tale-the-turnip-128530.html>) and *"Riaba the Hen"* ([https://wikitranslate.org/wiki/Riaba\\_the\\_Hen](https://wikitranslate.org/wiki/Riaba_the_Hen)) we can find the embodiment in the form of visual and objective thinking of many mathematical, physical, philosophical, and logical principles. These are the laws of the transition of quantity into quality, the negation of the negation, and the rule of sequential analytical ("chain") thinking: "...grandmother for grandfather, grandfather for turnip...". This is also one of the laws of catastrophes ("...the mouse waved its tail and the egg broke..."), which says that any system can resist external destructive influence for a long time at the expense of internal compensatory capabilities, until it exhausts the resources of its "homeostasis" and begins to disintegrate, while this process acquires an avalanche-like catastrophic character, and the reason for which can serve as a completely insignificant circumstance.

The fairy-tale *"The Little Bun"* (<https://pa-russki.com/bilingual-trip/the-round-little-bun/>) demonstrates to young children the secret of the creation of the world, which, firstly, has a spherical shape, secondly, is

created by two opposite aspects ("grandfather and grandmother"), and, thirdly, is created from "nothing" [21] ("scrape the bottom of the bucket") – a physical vacuum.

The fairy-tale *"The Goldfish"* (<https://www.fairytales.biz/alexander-pushkin/fisherman-and-the-golden-fish.html>), in addition to moral aspects, demonstrates to children not only the law of the transformation of quantity into quality, but also the fundamental law of human personality development towards the Absolute: no desires and material claims in this world can satisfy even such a simple and primitive creature as an old beggar woman, who ultimately seeks to leave the objective field of desires into the sphere of the Absolute, when she wants to absolutize the desire itself, making the Goldfish a "servant for her errands".

A fairy-tale can help in the study of history (V. Propp), since many historical events are similar to the structure of a fairy-tale, which opens up broad prospects for establishing typical structures of historical and life events.

A fairy-tale becomes an important means of processing and developing the internal code of a child's inner language, where words are usually replaced by other signals, visual schemes. Children face serious difficulties in transitioning from a listened text to a similar one, but expressed in "their own words", due to the insufficient formation of the inner language, in which words, concepts are usually replaced by other signals (images, metaphors, visual schemes, etc.). Thus, a fairy-tale with its metaphorical means of expression and principle orientation to the right-hemispheric reflection of reality is a reliable tool for the formation of a child's inner language.

Most importantly, a fairy-tale also becomes a means of developing a spontaneous, paradoxical worldview – the pinnacle (and at the same time the starting point) of human development. Here we can talk about the fairy-tale "poetry of absurdities" of Lewis Carroll, about the literary tradition of symbolic inversion, which in children's word-formation is manifested in most interesting language creations of children.

A harmonious person due to a new paradigm of preschool education is understood due to a new paradigm of preschool education as the person who combines right-hemispheric (multiple-meaning, metaphorical) and left-hemispheric (unambiguous, analytical) types/strategies of thinking, which opens the way into the sphere of development of paradoxical dialectical logic, the foundations of which are laid precisely in paradoxical/mystic fairy-tales. This, in turn, determines the creation of an innovative pedagogical direction – *the pedagogical paradoxology*, the foundation of which has been laid in our works [3].

Thus, the fairy-tale is an important means of developing the creative abilities in preschool and primary school children. This process stems from the peculiarities of their perception of reality – primarily through the prism of mythological and fairy-tale contents. And if the most essential aspect of our world is movement, the multifarious mutual/cyclical transformations of various phenomena, then fairy-tales, replete with various metamorphoses and rich in mythological and

cyclical events, best give children the idea of a changing, fluid, paradoxical world being a combination of linear and non-linear/cyclical processes.

Creativity is a rapture into the sphere of a polisemantic, multi-dimensional understanding and mastering the reality, that is, creativity involves overcoming situational givenness as the ability of the person to overcome the boundaries of unambiguous/linear constructions of "external expediency", revealing the ability to see "the whole before the parts". The fairy-tale in this context can act as a means of developing the child's creative imagination, its ability to go beyond the boundaries of immediate existence and to manipulate the categories of the potential and virtual.

It is this supra-situational activity that provides the child's spontaneous orientation in the sphere of living points of growth of human culture, enabling the mastering of the forms of spiritual and practical experience of humanity, it is here that the mechanism of universalization of the child's zone of proximal development is revealed, thus opening the perspective of unlimited development of the human being as a subject of culture and history.

### 5.3. Changing the Traditional Paradigm of Teaching Exact Disciplines

The conducted analysis reveals the need to *change the traditional paradigm of teaching exact disciplines*. Let us take physics, which like other exact disciplines, at first glance, is the most concrete academic discipline. Physics deals with the knowledge of specific physical phenomena that can be directly or indirectly recorded and verified experimentally, and therefore explained and cognized. However, with a deeper and more detailed analysis of physical phenomena, we sooner or later encounter phenomena that are not correspond with the rational understanding and which are difficult to bring under a satisfactory explanatory basis.

As an example, we can note the phenomenon of corpuscular-wave dualism, which reveals the paradoxical properties of an elementary particle capable of combining two physical states that are mutually exclusive, since the particle simultaneously appears as both a discrete entity (localized in space and time) and a wave (which does not have a strict time and spatial localization). One can mention many other paradoxes of modern science that reveal the phenomenon of logical immunity, when purely logical means of cognition are insufficient for cognizing the world. This requires the use of a metaphorically-multiple-meaning, paradoxical strategy of cognition, especially since in the field of physical research there are facts when the principle of paradoxicality serves as a valid basis for expert assessment of physical theories. Let us give an example when the famous physicist Niels Bohr in 1958, after Wolfgang Pauli's report of Heisenberg's and Pauli's nonlinear field theory for elementary particles, at Columbia University, remarked: "We all agree that your theory is crazy. What we do not agree about is whether it is crazy

enough to be true."

It is noteworthy that the world at its fundamental quantum level (at the level of the microcosm) is a single inseparable complex, in which such concepts and phenomena as cause and effect, single and multiple, simple and complex, part and whole, actual-real and potential-possible, past and future... are not differentiated, which gives the right to speak of the Universe as a holographic universe, in which everything exists in everything, when each elementary particle, in essence, is all elementary particles. This unity of the Universe finds many experimental and theoretical projections in the domain of relativistic physics – for example, *the Einstein-Podolsky-Rosen paradox*, the essence of which is that fragments of a complex nucleus, flying in different directions, instantly have information about each other, which finds its reflection in cosmology and astronomy.

The question arises: how to study paradoxical physical phenomena that are impossible to understand within rational way of thinking? This applies not only to specific, but also to general physical categories, such as space and time, which, as modern/relativistic physics teaches, are inextricably linked and capable of passing into each other.

Therefore, physical paradoxes cannot be neglected in the process of a consistent study of the physical picture of the world, otherwise such a study will be incomplete and eclectic: there is practically no branch of physical science in which paradoxes would not appear, including the most significant segments of these branches.

Therefore, in addition to scientific thinking in the process of world cognition, the physics as an educational subject should involve a paradoxical-dialectical, fairy-tale-metaphorical understanding and interpretation of the world. Now, when pedagogical science is on the path of changing its paradigm, it is time to restore the real status of physics, as, indeed, mathematics, since higher mathematics, which stems from elementary mathematics, is also full of paradoxes (refer to the paradoxes of set theory, the paradoxical nature of transfinite numbers that are in the process of infinite growth, etc.).

In general, not only when studying the humanitarian, but also the exact sciences, an essential imperative of comprehending the world presupposes the use of paradoxical thinking, inherent in the religious-mythological worldview, characteristic of both the representatives of ancient civilizations and children who perceive and master the world holistically, syncretically, polysemantically, at the level of the functions of the right hemisphere of the brain. Logical operations and causal univocity are alien to the thinking of young children, as well as to the representatives of primitive communities who base their understanding the world on paradoxical, ambiguous thinking, for which there is no strict distinction between part and whole, cause and effect, inner and outer aspects of reality.

## 5.4. The Methodical Working Out of the Implementation of the Fairy-tale in the Educational Process

Thus, innovative directions of modern pedagogy – teaching fairy-tales and pedagogical paradoxology, providing the *new paradigm of preschool education*, become a powerful resource for the development of child's personality, who is nowadays, for the most part, in the nets of the Internet – *the World Wide Web*, one of the negative consequences of which is the development in the youth of "clip", "digital", "black and white", "maximalist" thinking and mastering of reality [3].

Let us consider the main developmental philosophical and scientific aspects of the fairy-tale "*The Turnip*", their step-to-step implementation in the educational process of preschool and primary education institutions.

### 5.4.1. The Author of the Fairy-tale, Story, Parable, Short Interpretation of the Fairy-tale

Folk tale. Short interpretation: the grandfather planted a turnip; when it grew, it took the efforts of all family members, as well as domestic animals, to pull the turnip out of the ground; in the end, the result was achieved with the help of a mouse that lives in a hole near the house; a total of six participants was needed to achieve the goal.

### 5.4.2. Educational and Developmental Resources

*Development of left-hemispheric abstract-logical thinking, the formation of physical and mathematical representations about the world, which is realized in such ideas and concepts as:*

- 1) the principle of cause and effect, which consists in the fact that the cause is the process of planting a turnip (in the form of a seed), and its consequence is its growth, as a result of which we get a harvest;
- 2) goal-result: in order to pull the turnip, one should use a tool(s) – people and animals;
- 3) transformation of the potential into the actual (the potential seed is eventually realized into the actual one – the fruit);
- 4) growth and change: the growth of the turnip and the transformation of the seed into the fruit;
- 5) a linear thought process that reveals causes and effects;
- 6) accumulation and summation of factors: six beings participated in the process of extracting the turnip in a linear succession;
- 7) the dialectical law of the transition of quantity to quality: a gradual increase in the number of participants, the last of which was a mouse;
- 8) the basic law of catastrophes: a system can maintain its internal stability for a long time under the destructive external influence until the system exhausts its resources of stability and begins to collapse in an avalanche-like manner, and the factor for this is a least influence – a

small mouse.

*Actualization of the functions of right-hemispheric figurative polisemantic mythological thinking, which is realized in such ideas and representations as:*

- 1) the process of hidden and wonderful growth of a seed, which gives the result – a turnip;
- 2) the turnip in a metaphorical form embodies the way of life of a person and the result of this life;
- 3) the paradox, which consists in the fact that the little mouse turned out to be the main reason that led to the desired result.

*Speech development.*

The fairy-tale is quite short, its presentation uses simple words that teach the child to pronounce specific letter combinations.

*Development of ecological consciousness, which involves the formation of ideas in the child about:*

- 1) growth and development of nature;
- 2) the inexhaustible resources of nature, which gives a man the means of subsistence for free, one has only to plant seeds;
- 3) interaction with nature to obtain its benefits;
- 4) the unity of man and the animal world.

*The development of moral and legal consciousness and social contacts being realized through the formation of the child's ideas about:*

- 1) the unity of man and the animal world;
- 2) collective labour and collective effort to achieve the goal;
- 3) the social structure and system of socio-natural hierarchy.

*Psychotherapeutic resources.*

The child's psychological problems when projected onto the plot of a fairy tale (especially if this plot receives a plot-role run-in) are resolved (creating the psychophysiological state of *catharsis*) in the conditions of child's identification with the problems of the fairy tale. Fairy-tale "*The Turnip*" teaches children how to interact with social environment in a harmonious way, thus forming an understanding that each member of the community is equally necessary and valuable for the activity of the human community.

### 5.4.3. Several Parallel (Similar) Fairy-tales, Stories, Parables

An outstanding Ukrainian pedagogue, V. Sukhomlynsky, has composed a story "*The Feat of a Mosquito*" [22] (p. 428): "A Barrel stood over a deep chasm. It stood for many years, and everyone was amazed: it stood firmly, no one could move it.

And then one day a Mosquito flew over the chasm. He saw something standing over the very cliff. "What is it?" thought the Mosquito, while lowering down to rest.

But he had barely sat on that Barrel when it fell into the chasm...

People exclaimed in surprise:



- Look, how strong the Mosquito is! He moved the Barrel, threw it into the chasm.
- The Mosquito heard people's praising, and became proud:
- So, I really am the strongest in the world."

#### 5.4.4. Specific Methods of Working with the Material

Story-role play. Reproducing a fairy-tale using drawings, plasticine, etc. Narrating a fairy-tale. Retelling a fairy-tale following the teacher. Demonstration of physical and mathematical phenomena revealed in a fairy-tale using visual aids. Depicting by a child of its place (as well as members of its family, friends and acquaintances) in a fairy-tale. Enriching the fairy-tale with other characters. Working with the fairy-tale plot (children change the plot).

## 6. Conclusions

- 1) The article contains the analysis of the fairy-tale not only as a developmental, educational/upbringing, correctional and therapeutic tool. It is shown that the teaching resources of the fairy-tale remain outside the attention of scientists, and the use of these resources can be aimed at the formation of logical-mathematical, philosophical, physical knowledge in children.
- 2) Along with the development of left-hemispheric, abstract-logical abilities in schoolchildren, the paradoxical multiple-meaning, right-hemispheric forms of thinking should be preserved and developed, which find their implementation at the level of the fairy-tale, mythological-metaphorical layer of human culture. Myth and fairy-tale (built on the principle of paradox, mystical/wonderful transformations) are characterized by certain quite universal content and plot patterns, which indicate the deep evolutionary meaning of the fairy-tale and mythological tradition.
- 3) Myths and fairy-tales, as shown in the pedagogical concept of a teaching fairy-tale, carry in a condensed figurative-metaphorical form the information about the world, which is generally adequate to modern scientific ideas, revealing the phenomenon of "cognition before cognition" (refer to J. Krüger's book *"Signposts to Silence. Metaphysical mysticism: theoretical map and historical pilgrimages"*). F. Capra wrote quite clear about this phenomenon in his book *"The Tao of Physics: An Exploration of the Parallels between Modern Physics and Eastern Mysticism"* where he convincingly showed that the thinking of a mystic being immersed in the mystical depths of the Universe and the thinking of a contemporary physicist studying the quantum/fundamental structure of the Universe are in many ways similar not only in terms of their content (information about the world, which is similar in mystical and physical interpretations), but also in the movement of thought, which reveals paradoxical features of our world.
- 4) Reading the fairy-tales and listening to them by the children switch on the mechanisms of reproductive imagination: the highest development of these mechanisms allows the reader/listener to reproduce the images of literary works (the fairy-tale), as the writer sees/feels/perceives them. If the psychophysiological goal of human development can be considered the achieving the state of functional synthesis of the hemispheres (when the sign-verbal information, being perceived mainly at the functional level of left-hemispheric mental processes, is easily transformed into the imaginative-emotional sphere of the right hemisphere, and vice versa), then such interhemispheric transformation processes revealing the human ability to verbalize and de-verbalize the perceived information (that is, the ability to "dress" the emotional-figurative information in sign-verbal "attire", and the opposite ability to reversely transform a sign into an image, a word – into an emotion). Such interhemispheric transformation needs attracting children to the artistic treasury of human civilization, which develops children's ability to generate figurative information in the sphere of their own artistic and aesthetic representation, and this, in turn, is a cornerstone of the development of creative thinking and implements the main mechanism of thinking as such – diplasty (a person's ability to combine in one logical and psycho-emotional context the opposite and mutually exclusive concepts, images, objects, states, stimuli).

## Author Contributions

Alexander Voznyuk is the sole author. The author read and approved the final manuscript.

## Conflicts of Interest

The author declares no conflicts of interest.

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