

# Music and Game Activity of Elementary School Students as an Aspect of Neuropedagogy

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**Abstract:** *The research presented in the article testifies to the effectiveness of computer modeling in the conditions of musical and game activities of elementary school students. The relevance of the research is determined by the intensive development of innovative digital technologies that influence the development of society, form new approaches to the world, and contribute to the effective acquisition of new knowledge and skills as a neuropedagogical aspect. The purpose of the research is to study the effectiveness of the organization of musical and game activities as an aspect of younger schoolchildren by means of computer simulation. To increase the effectiveness of research, it is necessary to analyze aspects of neuropedagogy. In order to better "know" his student and decide on the choice of work methods in the future, it is advisable for the music teacher to evaluate not only his physical data and temperament, but also to find out by testing his general functional features organizations the brain and the leading modality.*

*Accordingly, the main approaches to the organization of music and game activity were analyzed and the effectiveness of computer modeling in the context of the formation of music and game abilities and skills in younger schoolchildren was determined. The research methodology is formed by analytical and research methods, analysis of musical and game activities, methods of synthesis, analysis and interpretation, computer modeling technologies are used. The results of the study show that computer simulation is the most effective in the modern educational process.*

**Keywords:** *Post-industrial society; creative abilities; creativity; values; cultural development.*

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## Introduction

The relevance of the study on the organization of music and game activities of primary school students lies in the importance and significance of the formation of appreciation of the arts in society. The educational environment shapes a person's perception of the world, and a person who has acquired values and competencies during his studies does not change his worldview during his life. Therefore, the education of cultural and spiritual values in the child is extremely important for the progress of society as a whole. Cultural development and the system of values are an important component of progress in society, because culture is the heritage of humankind in the course of historical development throughout life.

Based on the scientific and methodological analysis of the researchers of the problem, it was determined that the main aspect of educational activity is neuropedagogical technologies that increase the ability of the individual to adapt to new challenges, to evolutionary and civilizational manifestations, to new digital technologies. environment, to the challenges of the 21st century and the new generation.

The formation of culture and spiritual values is the result of effective pedagogical activity. In order to increase the effectiveness in achieving his goal, the teacher must organize game activities with musical accompaniment. Such activities contribute to the emotional coloring in the perception of the environment and increase the effectiveness of the development of primary school students, the formation of their appreciation of the arts. In the context of the implementation of the pedagogical task of forming the value of primary school students in culture, the teacher must be versatile, communicative, and ready for the creative implementation of various tasks and for the interpretation of images. The teacher should organize his activities to promote the emotional reflection of new knowledge.

Some scholars interpret the game concept of culture as the main methodological approaches to the formation of competence (Ananiev, 1980; Bern, 1992; Bibik, 2002; Geising, 1994; Melnyk et al., 2021; Melnyk et al. 2019; Sheremet et al., 2019, etc.).

The purpose of the article is to analyze and investigate the effectiveness of computer modeling in the organization of music and game activities of the primary school students.

### **Theoretical principles of organization of music and game activities of primary school students**

The organization of music and game activities of primary school students is the main context of our study. Game is the main type of knowledge of the world by children, and, consequently, an important approach in shaping the worldview of a child and one of the most important methods in the implementation of educational technologies. The game helps a child to learn new things painlessly and develops different skills and abilities in children. The child easily perceives new phenomena for him through the game. Therefore, a teacher should organize game activities for primary school students in such a way as to implement the most important functions of learning: diagnostic, corrective, communicative. The organization of the game should contain a creative and at the same time purposeful approach in pedagogical activity.

The main purpose of educational activities is to prepare primary school children for socialization. Therefore, the game is an important way to achieve the goal. In order to increase the effectiveness of the educational goal, it is necessary to organize music and game activities for children, which creates an additional condition for the child's socialization, because music has a positive effect on the aesthetic perception of the world around.

Based on the conclusions of scientists on the relationship between children's perception of the world and pedagogical influence on the formation of their value orientations (Marievich, 2013; Padalka, 2008), etc.), we believe that it is necessary to properly organize pedagogical activity. In order to increase the effectiveness of pedagogical activities, it is necessary to combine it with music education, which will increase the effectiveness of pedagogical activities.

Some scholars (Kudykina, 2003; Padalka, 2008) claim that music pedagogical activity promotes the development of not only highly specialized skills and abilities, but also forms competencies in the humanities, arts and other fields of educational activities.

A. Kolomiets (2007) highlights the importance of combining pedagogy and art for the effectiveness of achieving the educational goal for primary school students who are beginning to form their worldviews about life in society and self-realization. G. Vatamanyuk (2014) is deeply convinced that the modern post-industrial world needs a new personality that has a holistic view of social progress and is able to quickly adapt to innovations that change human life in modern society very intensively. Such a personality

can exist under the conditions of the formation of cultural and spiritual values.

In the theoretical approaches of J. Geising (1994) it is proved that the game is the main factor in the cultural development of society. The researcher argues that culture is formed through a person's playful perception of the world.

Thus, based on the study of scientific approaches and conclusions of scientists, we argue that the organization of music and game activities for primary school students is one of the most effective ways to implement the pedagogical conditions for the socialization of the individual.

### **Research of computer modeling of the organization of music and game activity of primary school students**

The period of modern history is characterized by the development of information technology, its penetration into almost all spheres of public life. This trend encourages the reform of the basics of educational activities. There is a need for the formation of computer competence in both children and adults in the learning process (Kolomiets, 2007). However, the main role in the formation of a post-industrial society is played by the representatives of the new generation, who will have the skills of computer technology much better than the representatives of the previous generation will.

When organizing music and game activities of primary school students, it is necessary to introduce new approaches to information and communication technology of learning (Settel et al., 2009). Computer modeling is modeling with the help of information models, i.e. special software or graphic, text editor or presentation. When organizing music and game activities, computer simulation is the most effective way to reproduce sounds or musical events that did not take place in reality (Mead, 1963). Thus, to organize music and game activities with students in reality you need to involve many resources: different musical instruments, use of already formed skills of different instruments, which at a young age is not enough, because a child is just beginning to acquire skills in musical instruments (Van Lange, 2007). Therefore, the alternative to the effective organization of music and game activities is computer modeling (Bibik, 2002). To organize the game, primary school students should use music perception to simulate the process of creating music, sounding an instrument, arranging, etc.

The game most fully shows the process of creating art, and consequently cultural development. The game encourages creativity, ease

and the desire for self-realization. The game begins with a spontaneous action, which has no purpose, but such spontaneity stimulates the performance of a certain rhythm, a sound that becomes similar to the creation of music. Even in primitive society, art was formed on the basis of a game. Thus, people began to perform magical movements, which were accompanied by various sounds in order to achieve a certain goal in the rite. This is how the art of dance and music arose.

The game is similar to art, because in the game a child experiences different combinations of actions and methods with things to get some pleasure (Vasylenko, 2003). Art also arises from a combination of methods and ways of creating something “beautiful” to meet the aesthetic needs of the individual and demonstrate them among others.

Music is a special kind of art, which is one of the main technologies of education and formation of children's value orientations. Music game makes children want to create different images that can be imaginary or real. Children, creating images, strive for beauty, that is, improve their activities to create a beautiful effect (Ferris & Bannon, 2002).

Music education involves introducing a child to an improvised game, which forms in them creative thinking and encourages the creation of new cultural achievements.

The process of appearance combines art and game. Thus, both concepts arise based on human fantasy, illusion, imagination. It is important not only to organize the game for primary school students, but also to observe them during the game, analyze their behavior and explore the impact of the game on the formation of personality (Gygli et al., 2019). Both game and art are an effective way to form a personality capable of socializing and developing his talents in the process of life.

Computer modeling increases cognitive abilities in a particular subject, increases creative abilities in the process of creating music and game activities of primary school students (Wojnar, 1964). Thus, in order to create a game with music, you need to have the skills of information competence. The process of creating a musical game should use computer technology, such as creating a musical composition using a special program - playing the piano or other musical instrument (Gardner, 1983). Computer simulation is also a technology for composing a piece of music or changing the tempo or melody in different pieces.

Children can create a piece of music in person or change the sound of already known melodies. This possibility of modeling forms in children an idea of their abilities and talents, which contributes to the self-realization of their individuality in society. In addition, the organization of musical and

game activity especially promotes the formation of spiritual and cultural development of the personality of the primary school students (Giddens, 1991). The child becomes more motivated to learn about the world and self-realization. Thus, the organization of music and games activities of primary school students in the context of computer modeling forms in them motivation for creative activity, for self-realization and socialization.

Among all the arts, music making is one of the most difficult. It combines a huge physical, emotional and mental load. Therefore, the teacher is required to have a special, caring attitude towards the child-student entrusted to him. Before starting the educational process itself, the teacher must thoroughly study his ward. Today, for successful learning to play an instrument, it is clearly not enough to simply determine the level of such abilities as musical hearing, musical memory and sense of rhythm, it is necessary to determine the neuropedagogical features of cooperation with the child.

The general functional organization of the brain is characterized by three types:

- 1) left hemisphere,
- 2) right hemisphere,
- 3) equal-hemispherical.

Game activities are most effective in the process of socialization of a child, because the child through the game learns the world and acquires cultural and educational experience, his personality is formed (Imel, 1998). The game attracts a child, because he gets the emotions he needs, develops thinking and creative imagination, emotional intelligence as much as he can personally adapt.

Musical game activities form in children an aesthetic perception of the world around them, a sense of beauty and catharsis. Music education contributes to the sublime emotional coloring in the activation and acquisition of new knowledge. Children are involved in creativity and as a result - more effectively create something new, that is, acquire creative abilities (Gray, 2019). In the process of musical-game activity there is a synthesis of game and musical art, which encourages children to form a composer's perception of a musical work and the emergence of the idea to be an active participant in musical creativity (Iqbal et al., 2017). They have a compositional logic in the process of playing and a drive for artistic creativity. Thus, a psychological relationship is established between the pedagogical and musicological aspects of the formation of cultural development in junior students.

### **Music and game activity as an aspect of neuropedagogy**

In recent decades, the process of individualization of education occupies one of the important places both in theoretical research and in the practice of education. The methodology as a science is developed in different areas of psychology with the aim of optimizing training for people with different psychological characteristics of the personality. Research in this direction is driven by a new concept, which is that there are no people who are incapable of learning, there is a teaching method that does not suit them.

Studying a huge amount of psychological data about the characteristics of a person's personality, the main problem and the simultaneous task of methodologists becomes the choice of those criteria that will have the greatest impact on the learning process and the understanding of how these data are used to increase the effectiveness of learning. Such activity is an aspect of the neuropsychological development of the personality, where the cerebral activity of the hemispheres is decisive.

It is necessary that the very idea that people with different dominant hemispheres use different strategies for processing and remembering information is not new, but these portions of theoretical research are not applied in classrooms in actual training, perhaps because developing a system of practical application turned out to be not so simple.

Educators are convinced that music-play activities can significantly improve the situation for many students who are unable to find themselves within the limits of traditional learning, but they do not have four recommendations on how exactly to use neuropsychological data. They follow a simple path of contrasting the functions of the hemispheres, despite the fact that it is impossible to allow their independent isolated functioning in ensuring cognitive activity. Of course, it does not follow that the results of the study of interhemispheric interaction in human information processing cannot be used to optimize learning in general and musical and game activities in the process of computer simulation. Both hemispheres are undoubtedly involved in complex cognitive processes, but their strategies are significantly different. Left-hemisphere people are distinguished by a "parts to whole" approach, a consistent and logical way of processing information, while right-hemisphere people perceive the world "from whole to parts", quite intuitively. At the level of teaching communication and information technologies, this is manifested in the selection of two types: intuitively sensitive (communicative) and rational-logical (non-communicative).

Behavioral and cognitive differences between people with different dominants have been described by many researchers. Neuropedagogy is being developed as a way to solve the problem of school failure. It is assumed that the knowledge of neuropsychology should be based on the pedagogical process not only by psychologists, but also by teachers who can diagnose those who study and predict problems arising from the inferiority of the style of presentation of educational material and the individual lateral profile of the student. "Neuropedagogy can be defined as a science using knowledge of differential psychophysiology, neuropsychological knowledge, data on the brain organization of the processes of mastering various types of educational material, taking into account the compatibility of the options of students and teachers.

Therefore, music and game activities should be used to form effective learning, using the neurophysiological features of the individual. Practical recommendations for learning as a process of computer modeling are presented in several stages: motivational, operational and productive. Thus, for the right hemisphere, it is necessary to focus on the social and practical significance of one or another type of activity, and for the left hemisphere, cognitive motives are more important, since they are primarily attracted by the process of acquiring knowledge. The main task for the left hemisphere is the translation of theoretical knowledge into practical use, and for the right hemisphere - strengthening control over the correctness of one's activity. At the last stage, it is important to choose an adequate method of testing the student's knowledge. For the right department, it will be an oral survey, which will give an opportunity to show your creativity, and for the left department, written surveys, "closed" type questions will be best suited.

In the West and in America, quite serious developments of practical application date back to the late 1970s and early 1980s. It must be said that research in the field of how knowledge about the human brain can be applied in education was not limited to interhemispheric asymmetry and seeks to cover all aspects of the characteristics of the brain's behavior during learning. However, among the studies on this topic, you can find a number of monographs that directly connect hemispheric asymmetry with the learning process and, in addition, offer tests for determining the dominant hemisphere and a system of exercises with an analysis of how they are used by students of various psychologists.

The educational process has noticeably "rejuvenated" now. Children who have barely learned to walk and talk attend aesthetic circles and clubs created at art houses, children's art schools and other institutions of

additional education. Undoubtedly, this is a great help in identifying and developing the child's abilities. In such institutions, children develop comprehensively, learn rhythm, draw, sing, dance, participate in educational games. Already at this age stage, it is possible to determine with high reliability inclinations to various types of activities, which in the future will help to make a choice in favor of a further profession.

Among all the arts, instrumental music making is one of the most difficult. It combines a huge physical, emotional and mental load. Therefore, a special, caring attitude towards the child entrusted to him is required from the teacher. Before starting the educational process itself, the teacher must thoroughly study his ward. Today, for successful learning to play an instrument, simply determining the level of such abilities as musical ear, musical memory and sense of rhythm is clearly not enough. In order to better "know" his student and decide on the choice of work methods in the future, it is advisable for a music teacher to assess not only his physical data and temperament, but also to find out through testing his general functional organization. brain and leading modality.

The general functional organization of the brain is characterized by three types:

- 1) left hemisphere,
- 2) right hemisphere,
- 3) isospherical.

Left hemispheric type. It includes people in whom logical perception prevails over sensory perception. The dominance of the left hemisphere determines the tendency to abstraction and generalization. The left hemisphere specializes in working with words, conventional signs and symbols; responsible for writing, calculation, ability to analyze, abstract thinking.

The left-hemisphere components of thinking organize any material in such a way that a strictly ordered and unambiguously understandable context is created, which is necessary for successful communication between people. During its formation, from all real and potential connections between objects and phenomena, a few specific ones are selected that do not create contradictions and fit into the appropriate scheme. Thus, a word included in the context acquires only one meaning, although there may be several in the dictionary. Elements of an unambiguous context can be not only words, but also other symbols, signs and even images.

"The main function of the left hemisphere is to select a figure from the general background and work with this information in the focus of attention. The left hemisphere is responsible for conceptual thinking, aimed

at one, only correct decision, forecasting future events, putting forward hypotheses. It is "formal" logic that distinguishes false statements from true ones (Onishchuk et al., 2020). The left hemisphere is a visual model of the world divided into separate elements. The memory of the left hemisphere preserves perceived stereotypes and a system of social values. In addition, it performs sequential functions. Auditory (auditory) perception of information is leading in people of the left part of the brain.

Among them are many engineers, mathematicians, philosophers, linguists, representatives of theoretical disciplines. They are often rational and write a lot and willingly, easily remember long texts, their language is grammatically correct. They are characterized by a heightened sense of duty, responsibility, principledness, internal processing of emotions. In musical activities, representatives of this type often become methodologists, music critics, talented teachers, and not performers. They usually prefer to act according to pre-made schemes, stencils, and struggle to rebuild relationships with people.

Right hemisphere type. The dominance of the right hemisphere determines the propensity for creativity, the concrete-figurative nature of cognitive processes aimed at developing as many options as possible for solving the problem of thinking. The right hemisphere of the brain specializes in operating images of real objects and is responsible for orientation in space. Its functioning is determined by visual thinking, which is connected with a holistic view of situations and those changes in them that a person wants to get as a result of his activity.

"The right hemisphere regulates subconscious processes, analog processing of information, involuntary control of behavior. It produces continuous topological, spatial transformations of information, assessment of symmetry, structure, complexity of the object. He deals not with the figure, but with the background, not with the center of attention, but with the periphery. Thus, the right hemisphere does not provide concentration, but the distribution of attention. It is the keeper of a continuous picture of the world, involuntary emotional memory, provides intuitive, sensual, imaginative thinking, hypothesis testing, deals with real time, actions "here and now". The right hemisphere is the organ of the human unconscious, the organ of imitation. It takes everything seriously, it is a hemisphere of resentment and depression."

The function of the right-hemisphere components of thinking consists in the simultaneous grasping of a large number of contradictory from the point of view of formal logic connections and formation due to this integral and multi-meaningful context (Zhurat et al., 2020). The

advantage of such a thinking strategy is manifested in those cases when the information is complex, internally contradictory and cannot be reduced to an unambiguous context, that is, in the creative process. If the organization of an unambiguous context is necessary for mutual understanding between people, analysis and consolidation of knowledge, then the organization of a multi-meaning context is just as necessary for penetrating the essence of internal connections between objects and phenomena. Without it, any creativity would be impossible. The leading modalities of right-hemisphere people are visual and kinesthetic (motor).

The language of right-hemisphere people is emotional, expressive, full of intonations and gestures. There is no special structure in it, hesitation, inconsistency, unnecessary words and sounds are possible. It is easier for them to dictate a text than to write (left-handed people, on the contrary, find it easier to write than to dictate). As a rule, right-hemisphere people are integral natures, they are open and direct in the manifestation of feelings, naive, trusting, suggestive, able to feel and experience subtly, get upset and cry easily, enter a state of anger and rage, sociable and contact. . They often act according to their mood. There are many writers, journalists, artists, and organizers among the right hemispheres.

Information that a person is not aware of (unconscious processes of the right hemisphere) can prompt him to take actions, the true meaning of which is inaccessible to the person himself (Vuckovic, 2019). When a person finds himself in conditions that require an urgent decision and immediate action, taking into account the entire complex and multifaceted situation, he often acts until he really understands and analyzes his actions. Moreover, after completing his actions, he is often unable to list them and put them in order. The behavior of such a person is as if unconscious, but takes into account all the key aspects of the situation. The fact is that the right hemisphere grasps all the information a little faster than the left. It recognizes complex and ambiguous information faster and more successfully.

Equivalent type. There is no pronounced dominance of one of the hemispheres, both are synchronously involved in the choice of thinking strategies. In addition, there is a hypothesis of effective interaction of the right and left hemispheres as the physiological basis of general giftedness.

"The division of people into the right hemisphere, the left hemisphere, and the right hemisphere is somewhat arbitrary, but it allows us to see the human personality much more clearly. It should always be remembered that the brain with the specialization of the hemispheres works as a whole. Moreover, the development of interhemispheric interaction is

the basis of the development of intelligence. The most sensitive age of a person for intellectual development is up to 10 years, when the cortex of the hemispheres of the child's brain is not yet fully formed. Therefore, the effectiveness of children's education will depend on the timely development of interhemispheric interaction and the selection of individual methods that take into account the profile of functional asymmetry of the hemispheres (Smith & Schwartz, 1997).

The process of localization of certain functions in the left or right hemisphere is called functional lateralization of the cerebral hemispheres. Sometimes the distribution of functions between the hemispheres does not follow the traditional scheme: the right hemisphere is humanitarian, the left is logical. There are cases of reverse lateralization of functions between the hemispheres: the right hemisphere is logical, the left is humanitarian.

## **Conclusions**

The purpose of the conducted research was to determine the effectiveness of computer modeling in the organization of musical and game activities of elementary school students. For this purpose, the main theoretical provisions of children's game activity as an effective educational technology of personality formation capable of self-realization and socialization were analyzed and it was determined that children's game activity effectively contributes to the assimilation of new knowledge and skills by students in the educational process.

Based on the conclusions of the researchers regarding the effectiveness of music and game activities in the education of younger schoolchildren, it was determined that the main trends in the formation of students' valuable attitude to art and culture during the period of intensive development of the information society are determined by ICT technologies. Thus, the results of the study give reason to believe that musical and gaming activity contributes to the formation of the idea of creating new artistic compositions based on the use of cultural achievements in the process of historical development and in the context of the modern informational world in a global world aspect.

To confirm this opinion, a study of the formation of creative abilities in children of primary school age was conducted based on methods of measuring creativity, which determine the level of development of creative abilities in primary school children. In order to determine the effectiveness of computer modeling in the organization of musical and game activities of

younger schoolchildren, indicators of the development of creative abilities of students before and after music and game activities were compared.

The work of the teacher in three modalities of perception is possible in absolutely all lessons. It is necessary to take into account the manifestations of the leading modality of each individual student. For example, it is impossible to force a kinesthetic student to sit still in class, as he remembers the material better when he is moving. The visual should be allowed to have a sheet in the lesson, on which he can draw, hatch, paint, etc. in the process of memorization. You should not criticize a student who perceives things by ear when he makes sounds or moves his lips in the process of performing a difficult task. Without it, he may not complete the task.

So, behind learning difficulties there are objective reasons that lie in the individual features of the functional organization of the brain, which is a manifestation of the neurophysiological features of personality development.

Based on the results of the research, it can be stated that younger schoolchildren have significantly higher indicators of creativity in the organization of musical and game activities.

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The authors' contribution to the work is important.

Author 1 gave a critical review of available publications on the researched problem, outlined in the article the theoretical aspects of the problem of organizing musical and game activities of elementary school students in the context of computer modeling

Author 2 identified the problems and shortcomings of the modern system of formation of musical and game activity, systematized the material from this point of view and presented it in the work.

Author 3 touched on an important issue: he identified the ways of forming the technological foundations of musical and game activities

Author 4, 5 worked on editing the text of the article, selected and organized the list of references.

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