Advancement of Teenagers' Creative Abilities Using Music Computer Technologies as a Guarantee of a Progressive Future in The Field of Artificial Intelligence Development

Irina B. Gorbunova, Valentina Yu. Mavrina

***Abstract*— The development of creative abilities among teenagers engaged in the exact sciences plays a key role in shaping an innovative future. In adolescence, the foundations of non-standard thinking are laid, the ability to find original solutions to complex problems and see new opportunities in scientific research. It is well known that a comfortable educational environment conducive to the effective education of adolescents engaged in the exact sciences is formed with the active and multidimensional use of modern technologies. A significant role here is also played by the possibility of relying on the work of scientists engaged in interdisciplinary research related to the study of mathematical research methods. In our works devoted to the development of the creative abilities of future programmers in the process of learning music, possible options for the introduction of musical and educational activities using music computer technologies (MCT) into the basic educational program of adolescents engaged in the exact sciences have been considered in detail in order to comprehensively develop creative abilities. We consider investments in the growth of teenagers' creative abilities using MCTs as a guarantee of a progressive future in the field of artificial intelligence development.**

***Keywords*— Artificial Intelligence (AI), Electronic Musical Instruments, Music Computer Technologies (MCT), Musical Therapy, Playing The Electronic Musical Instruments.**

I. Introduction

The computerization of modern society involves the gradual introduction of computer technology in all areas of education. Developing a teenager's interest in an additional field of education, getting to know the possibility of creating a new one is the way to develop his creative abilities. This is especially true in the music sector, where a wide variety of modern digital technologies are actively used. In our study, we have formed a scheme for a music teaching model that would contribute to the qualitative development of the creative abilities of adolescents engaged in the exact sciences [1-2].

The formed creativity will allow in the future not only to learn various knowledge and skills more mobile, but also to create innovative ideas that will be a catalyst for progress in the field of

II. The Use of Music Computer Technologies in Education

Advancement of teenagers' creative abilities using music computer technologies as a guarantee of a progressive future in the field of artificial intelligence development.

In order to maximize involvement in creative development, music computer technologies (hereinafter referred to as MCT) were included in the music learning process. The program is based on the principle of variability for different creative preferences of teenagers, ensures the development of musical creativity, forms a steady interest in creative activity, develops in the field of MCT.

Since we have focused on teenagers whose main activities are mathematics, computer science and other exact sciences, we have introduced modern MCT into music education. The software and hardware complexes developed in the research and methods laboratory *Music Computer Technologies* of the Herzen State Pedagogical University of Russia for creating computer music, digital sound processing, musical acoustics instruments and a digital musical instrument were used as MCT. The pedagogical concepts developed in the RML *Music Computer Technologies* Herzen University most vividly trace the fundamental foundations of the interaction of various interdisciplinary scientific approaches aimed at creating such an educational program for students. In the identified features of building a music teaching model using contemporary electronic music, the possibilities of creating educational technologies and a special environment were identified [3-8].

The use of MCT provides a motivated approach to mastering knowledge, on the one hand, already formed by children studying in physics and mathematics classes and classes with in–depth study of computer science and programming, on the other hand, it could become an effective basis for their comprehension of the humanitarian subject area (music).

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Author: Irina B. Gorbunova. She is now with the Department of Information Technology and Technological Education of the Herzen State Pedagogical University of Russia and Education and Methods Laboratory *Music Computer Technologies* of the Herzen State Pedagogical University of Russia, St. Petersburg

Author: Valentina Yu. Mavrina. She is now with the St. Petersburg Musical and Pedagogical College, Russia;

It is known that MCTs are a system of interrelated elements, such as:

- educational;
- creative (a new means of achieving artistic expression in the activities of musicians and composers);
- technical (a means of recording, processing, editing, recognition, identification of sound and musical signals, as well as a way to establish and preserve authorship);
- multimedia (as an interactive environment providing a qualitatively new level of information perception).

The introduction of computer technology into music education is a fairly new and progressive "vision" of musical art as such [9-16]. In addition to the basic principles of music teaching, MCT provides an opportunity to implement various creative tasks that contribute to the development of artistic imagination, observation, and imaginative-associative thinking. In addition, the high-tech educational environment requires the search for new creative learning systems.

The use of MCT in the educational process qualitatively improves the quality of musical art education at all levels of educational processes. The use of MCT in the educational process qualitatively improves the quality of musical art education at all levels of educational processes.

Researchers in the field of MCT I.B. Gorbunova and M.S. Zalivadny note the following advantages of using MCT in an educational environment:

- the ability to edit musical material (both textually and in audio recording and performance)
- the ability to edit the musical structure of a digital instrument
- the ability to create different sound images
- its programmability.

We have investigated the aspect of introducing MCT into the musical educational context in a specially created model of the music teaching methodology for teenagers engaged in the exact sciences. Software and hardware complexes for creating computer music, digital sound processing, musical acoustics instruments and a digital musical instrument were used as MCTs.

Thanks to research in the field of musical creative work using MCT, the following components stand out:

1) a musical computer as the main element of a new educational creative environment and software for a MCT educational complex;

2) a methodological system that allows for the adequate use of MCT at all stages of the educational process;

3) socio-cultural factor of education of a comprehensively developed personality.

III. The Introduction of Music Computer Technologies in Music Education for Teenagers Engaged in the Exact Sciences

In order to attract the largest number of teenagers to music education, to ensure the accessibility of music education, the duration of the general development program in the field of music education is an academic year. The program defines the content and organization of the educational process, is aimed at developing musical creativity, creating the basis for students to gain experience in creating musical compositions, arranging music, creating musical acoustics, playing the synthesizer and midi keyboard, thanks to music and computer technologies, and independent work on studying and comprehending musical art.

The program is implemented for students aged 12-17 years. The content of the music education program is closely related to the subjects *Solfeggio, Elementary Musical Theory, Listening to Music, Musical Literature, Musical Composition, Piano* and promotes independent further development, continuing education at a musical school, as well as possible admission to specialized musical colleges.

The purpose of the program is to create information security conditions for the formation and development of creative abilities through music education using the MCT.

Tasks:

Educational (subject-based):

- expanding our understanding of the latest trends in music related to information technology;
- acquisition of basic theoretical knowledge complexes: theory, harmony, instrumentation, musical form;
- acquisition of musical creation skills using MCT;
- mastering the techniques and methods of practical work on a computer in music editing programs.

Educational (meta-subject):

- development of creative thinking skills;
- development of motivation to master modern technologies in music;
- creating conditions for the formation and development of children's creative abilities, meeting their individual needs for intellectual and moral improvement;
- the impact of music on the emotional and intellectual potential of the student.

Educational (personal):

- formation of skills of communication culture, positive interaction and cooperation;
- formation of high social activity;
- formation of positive attitudes towards creative activity as the most important element of a child's general culture;
- formation of flexibility and adaptability, initiative, self-discipline;
- formation of readiness and ability for technological, organizational and social innovations.

Educational elements are part of the additional general development program *Music Education*:

1. “Music theory”.
2. “Composition”.
3. “Playing the Piano (Synthesizer)".
4. "Listening to music."

Figure 1 shows a model of the music teaching methodology for teenagers engaged in the exact sciences:

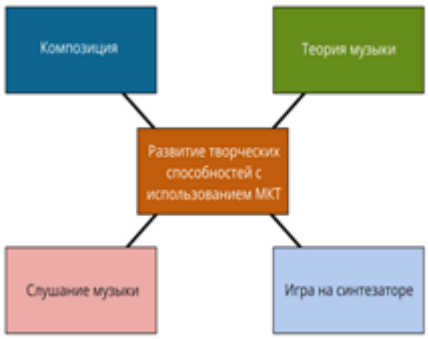

Fig. 1. A model of the music teaching methodology using MCT

The content of the program ensures the development of intellectual and creative abilities of a teenager, significant for education, socialization and modern society of the younger generation, the development of his personal qualities and musical and computer skills.

The amount of study time provided for in the curriculum of the music education program:

Duration of the course is 1 year.

Number of hours per classroom load is 72.

Weekly classroom load 2.

The form of conducting classroom training sessions:

small group (8 – 12 people on average), the recommended lesson duration is 45 minutes.

Classes are held once a week for 2 academic hours.

Goal: achieving a certain level of development of knowledge, skills and abilities in the field of music composition by means of MCT formation of students' skills in creating a musical composition;

•perception skills of classical and modern classical music.

Tasks:

- to identify the musical creative work potential of the student, to encourage and develop his musical imagination in conditions of maximum creative self-expression with the help of music computer technologies;
- to create a comfortable creative atmosphere for the most effective development of creative potential;
- to give an idea of elementary musical theory and musical form;
- contribute to the understanding of musical works;
- to master MCT for further independent creation of musical compositions, arrangements, sound engineering activities.

Forms and methods of control: goals, types, form, content.

The assessment of the quality of the implementation of the music training program includes the ongoing monitoring of academic performance and the final diagnosis of the participant in the experiment. The process of developing the musical creative potential of adolescent students is carried out using methods of observation and conversation. In addition, communicative, search, and research methods are used. The intermediate and final control of the subject is carried out in the form of an anonymous questionnaire with closed questions.

Forms and means of current control.

Demonstration of fragments of essays is used as a means of current control. During the control lessons, written essays are demonstrated, varying in size and technical complexity, depending on the level of training of students.

Approximate requirements for intermediate and final control:

1. Composing a small work in a simple 2 or 3-part form for piano or other solo instrument (duet or trio is possible) in the form of recording musical material in the Sibelius music editor.

2. Composing a program or genre work (waltz, march, prelude) in Cubase using audio editors and the introduction of sound special effects and electronic sound elements with further playing (partial or complete) compositions on a synthesizer (electronic (digital) musical instrument).

Due to individually differentiated and integrated approaches in music teaching in the context of information security, a more complete disclosure of the individual qualities of a teenager occurs [17-18]:

- music is an effective means of emotional communication, its influence on a person is multifaceted. Musical art teaches empathy;
- turning to MCT, engaging in artistic creativity on digital synthesizers makes it possible to build musical education in a new way; thinking through the elements of arrangement, thinking about other elements fosters creative thinking among modern teenagers;
- the program successfully develops creative abilities when working on creating a musical composition using MCT [19-20].

IV. Conclusion

The development of the creative potential of high school students and adolescents involved in exact and natural sciences can be significantly updated in the process of teaching them music according to a program based on modern educational technologies and MCT [21-28]. In addition, we identified the positive impact of music education on the development of creative potential in the process of interviewing a wide range of teachers during participation in conferences at the all-Russian and international levels, the topics of which were aimed at identifying key directions for the development of contemporary both musical and general education of adolescents.

The issues raised in this article are widely covered today during scientific and practical conferences, seminars, master classes, and creative competitions at various levels, which necessitates further research in the chosen direction [29-39].

It is especially important to develop such skills in the context of the future of AI. Teenagers with creative thinking will be able to develop more complex and flexible algorithms, create new models and approaches to machine learning. As a result, these people will become the driving force in the development of AI technologies, providing them with a deeper understanding, adaptability and the ability to develop independently. Thus, investments in the development of teenagers' creative abilities are the key to a progressive and innovative future in the field of technology.

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Irina B. Gorbunova was born in Saint Petersburg (Leningrad), Russia.

DipMus, Special Music Higher School of the St. Petersburg State Conservatory named after N.A. Rimsky-Korsakov; BSc in Computer Science: Information Technology, Computer Science and Multimedia, Leningrad State University, Ussurisk State Pedagogical University; MA in Education, the Herzen State Pedagogical University of Russia; PhD in Information Technology and Pedagogical Sciences, the Herzen State Pedagogical University of Russia, St. Petersburg, 1989; Doctor degree: Doctor of Pedagogical Sciences and Information Technology, the Herzen State Pedagogical University of Russia, St. Petersburg, 1999.

Dr., Full Professor, Chief Researcher of the Education and Methods Laboratory *Music Computer Technologies* at the Herzen State Pedagogical University of Russia, St. Petersburg; hold the degree of Honorary Worker of Higher Professional Education of the Russian Federation.

Prof. Dr. Gorbunova is a Chairperson of the annual International Research and Practical Conference *Contemporary Musical Education*: *Creative Work, Research, Technology*, held since 2002; Chairperson of the annual International Research and Practical Conference *Music Computer Technologies in the System of Contemporary Education*, held since 2007; International Research Conference, held since 2017;); Chairperson of the annual International Research Conference *Interdisciplinary East-West Discourse: The 21st Century. Creative Work. Research. Technology. Education*, held since 2020 (Baku, Azerbaijan – St. Petersburg, Russia).

Dr. Gorbunova is a member of the Jury of national and international competitions of musical creative works, including *Electronic Palette* (Saint-Petersburg), *Music and Electronics* (Moscow), *Music of the 21st Century* (Moscow / Saint-Petersburg), International Festivals and Competitions *Musical Electronics and Multimedia* (Moscow / St.-Petersburg), *CLARINE of the 21st Century* (St. Petersburg), *The World of Art without Borders* (Saint-Petersburg, Russia - Szeged, Hungary), *Bridge of Friendship* (Dortmund, Germany), All-Russian Competition of Electroacoustic Music *DEMO* (St. Petersburg, Russia).

Under the guidance of the professor, Dr. Gorbunova developed the first-ever bachelor's degree programs in *Music Computer Technologies* (2004) and *Information Technology in Music and Sound Design* (2023), as well as Master's degree programs in *Music Computer Technologies in Education* (2006) and *Digital Technology in Music and Sound Design* (2022).

Professor Dr. Gorbunova directs a number of doctoral and postdoctoral studies (more than 30) and lectures on music computer technology and information technology in music. She directs research in various fields, including: Theory and history of culture, musical art, information systems and processes, Theory and Methodology of vocational education, mathematical modeling, numerical methods and software systems, Theory and methods of teaching and educational work (in music, computer science, natural sciences). The research results of Prof. Gorbunova has published more than 550 peer-reviewed publications, including more than 50 books and more than 300 articles in various scientific journals.

Her research activities include such directions as:

MCT in professional musical education (as a means to expand creative opportunities);

MCT in general musical education (as one of the means of education);

MCT as a means of rehabilitation of people with disabilities;

MCT as the new direction in preparation of specialists of humanitarian and technological profile;

MCT in the field of digital arts; MCT in information technology, psychoacoustics and musical acoustics; system of training arrangements and the art of performing skills on electronic musical instruments.

Her circle of interests also includes the problems of interrelation of natural and technical sciences and humanities, as well as the possibilities of applying the results of such interrelation for the purposes of music education and upbringing.

She also takes part in working out the specialized software for computer music devices and in application of this software in pedagogical processes.

Her developments and researches also belong to the field of musical pedagogics and musicology, musical informatics, computer modeling of processes of musical creativity, timbre programming, art of performing skills and arrangement on electronic musical instruments, creative work in the field of computer music, mathematical methods in musicology

Valentina Yu. Mavrina

Methodologist and teacher of the St. Petersburg Musical and Pedagogical College.

Education:

2004-2008 – Tolyatti College of Arts named after R. K. Shchedrin, Theoretical Department, Tolyatti, Samara region, Russia

2006-2009 – Volga Region State University of Service, Department of Finance and Credit, Tolyatti, Samara region, Russia

2009-2014 – Gnessin Russian Academy of Music, Faculty of History, Theory and Composition, Department of Music Theory (Moscow)

014-2017 – Postgraduate School of the Gnessin Russian Academy of Music

2016-2017 – Interregional Academy of Construction and Industrial Complex, Diploma of professional retraining in the program "Management in education", (Moscow)

2021 – Certificate of advanced training in the Foxford Limited Liability Company under the additional professional program "Google Technologies in the professional activity of a teacher" (Moscow)

2023 – Certificate of advanced training at the Federal State Budgetary Educational Institution of Higher Education "Moscow State Institute of Culture" under the additional professional program "Strategies for overcoming professional stress and crisis situations" (Moscow)

2023 – Certificate of advanced training at the A. I. Herzen Russian State Pedagogical University for the additional professional program "Music Computer Creative Work" (St. Petersburg)

Work experience:

2008-2009 – teacher of theoretical disciplines of Children's Musical School No. 4 named after the Honored Worker of Culture of the Russian Federation Vladimir Mikhailovich Sverdlov of the Tolyatti city district, Tolyatti, Samara region

2010 – private practice of teaching general music development, solfeggio, rhythmics, musical literature, harmony, musical composition

2014-2015 – music teacher at the Private school "Financial and Economic School" (Moscow)

2014 – present – cultural organizer, music teacher at the Summer Computer School

2015 – 2017 – Head of the music club at the Youth Cultural Center, Korolev, Moscow region

2017 – 2020 – teacher at the Children's Music School named after N. P. Budashkin, Moscow

2017-2022 – teacher of theoretical disciplines at the Prokofiev Moscow Regional Music College, Pushchino, Moscow Region

2022 – present, Head of the educational part of the special cycle, methodologist, teacher of musical and theoretical disciplines at the Secondary Special School of the St. Petersburg Rimsky-Korsakov State Conservatory, St. Petersburg

2021-2023 - Postgraduate student of the Herzen State Pedagogical University Russia, scientific supervisor - Professor, Doctor of Pedagogical Sciences Irina Borisovna Gorbunova, St. Petersburg

2025 – present, teacher of the St. Petersburg Musical and Pedagogical College

She is the author of a number of articles published in various scientific journals, among them: Gorbunova I. B., Mavrina V.Yu. (2022). Development of creative of the future programmers potential in the process of teaching music. *Anthropological didactics;* Mavrina V.Yu. (2023). On conducting a pedagogical experiment to study the effectiveness of the methodology of teaching music to teenagers engaged in exact sciences in order to develop their creative potential. *The World of Science, Culture, and Educatio*n, and others.