Features of Teaching Music Computer Technologies for Students of Non-musical Specialties

Irina B. Gorbunova and Olga L. Yasinskaya

Abstract—Intensive development of music computer technologies has led to their extensive use in various kinds of musical creativity. This direction is actively developed in the system of preparation of the contemporary musician. Contemporary music computer tools allowed to diversify and enrich the options for musicians to perform the material in real time. The article is devoted to the main aspects of the problem, which modern critics, is to find the dependence between the structure of music and its impact on the emotional state of the listener. The article discusses the main aspects of the problem, which is engaged in modern art and musical education - to find the relationship between the structure of the music and its impact on the emotional state of the listener, and to analyze the possibilities of modern music computer technologies in the process of interpenetration and interaction of computer science and musical creative activities.

Keywords—musical creative work, musical computer, electronic musical instruments, music computer technologies, information technology in music.

I. INTRODUCTION

Teaching music computer technologies (MCT) [1; 2; 3] is based on the need for self-expression, aesthetic needs inherent in each person, so the social motivation of the student is of great importance. Often a person who has not received primary musical education at a young age begins to be interested in classes on mastering an instrument precisely because of the need for creative implementation, social prestige, belonging to a particular social musical and artistic environment in which a well-educated person is highly valued.

The deep and thoughtful development of contemporary MCT allows to compensate for the lack of musical education.

Dynamically developing modern information technologies are more interested and offer new opportunities for creativity [4; 5]. On the base of the Education and Methods Laboratory Music Computer Technologies of the Herzen State Pedagogical University of Russia classes are given on the subject “Music Computer Technologies in Education” where a special role is given to learning of professional and specialized software [4; 5] for creation and processing of musical material regardless of a presence of a musical education.

The discipline involves a series of lectures and practical classes devoted to the development of MCT during which the student learns a complex of MCT-programs for creative work and also theoretical sound architectonics, sound and timbre programming, the basics of music theory, playing music with electronic musical instruments (EMI) [6; 7].

The field of studying MCT is extensive and directly related to the field of sound engineering, so a non-musician student is invited to master a number of topics related to various aspects of the use of MCT, such as modeling the process of musical creative works, sound-timbral programming, creating audio -visual projects, etc. [8-10].

It’s psychologically easy for students to develop musical instruments using a MIDI controller and a musical computer (MC) containing many different tones.

It’s very important to understand:
- how sound is formed before the study of theoretical knowledge of music;
- the general scheme of a studio sound path and its implementation at home. Formation of a workplace in home conditions, arrangement of studio components, preparation of acoustic space;
- the necessary software to start effective work, the choice of a music program depending on tasks and capabilities. Equivalents of studio equipment and tools in a software environment. Ethics of using software and licensed versions;
- the necessary equipment to start effective work, a musical equipment market review, selection of optimal solutions, interfaces, acoustic control (monitors, headphones), controllers as a way of tactile interaction with a virtual environment, microphones;
- work with audio material: recording, editing, processing wave-files. Use of effects on the example of working in the Cubase software environment;
- analysis of the main functions and work areas of the program, analysis of all types of tracks (audio, MIDI, groups, return, master);
- recording, editing and playback with various sampling rates bit depths;
- full support for several multichannel sound format (surround) up to the 6.0 format;
- primary processing of the recorded audio track, changing the main signal parameters: frequency, dynamic and time;
- loading projects of another Steinberg software product;
- ability to use Cubase together with applications supporting ReWire protocol.

In practical classes students should learn how to record, process and mix audio material, learn the basic components of a modern recording studio mastering the work of audio materials in modern sound processing programs, learn categories and types of audio plug-ins.

For students who do not have musical education, work in programs begins with recording and editing audio material on any of the topics proposed. For example, it can be an audio recording of a recorded vocal part (voice) or editing previously connected to an instrumental composition; tasks of mixing of composition, perception of sound space and ways of its formation, work with space, monitoring, MCT-tools.

The student gradually adapts to the virtual environment and devotes most of the time to creating an artistic image while working with musical instruments and mastering existing virtual musical material. Special attention is paid to the analysis of musical material that affects the success of the work performed, the study of the basics of sound synthesis, sampling on the example of VST instruments, the basics of MIDI.

At this stage, students learn how to work with VST-instruments and, as experience shows, students are more interested in working with timbres than with the harmonic components, as a result they incline various genders of electronic music [11-13]. Complicated timbres of virtual synthesizers are in combination with simple harmonic components and multi private form.

Paradoxical it may seem, the forms of students’ work are often multi private as in the process of composing music they can and want to use all the tools that are available in a virtual environment, often it leads to the compositional development of the work.

It also should be mentioned that development of modern MCT is one of the main indispensable means of introducing students with deep visual impairment to music. The methodological development of this problem and its methodical implementations are done by the group of scientists, graduate students, educators and practitioners on the base of the Education and Methods Laboratory Music Computer Technologies of the Herzen State Pedagogical University of Russia that is reflected in a number of teaching aids, digital educational resources, and researchers’ works [14-17].

Acquaintance with music editors will expand the capabilities of non-musician students. It’s much easier to master musical literacy of these programs. But one of the most important results of the classes according to the program we developed is to reveal the enormous potential of the students themselves sometimes not suspecting their creative abilities in the music field.

Thanks to the virtual platform and the capabilities of contemporary MCT-tools, it’s becoming much simpler and easier to learn music computer technologies and apply it that is very important for students without musical education.
Irina B. Gorbunova was born in St. Petersburg (Leningrad), 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, USSR; MA in Education, the Herzen State Pedagogical University of Russia; PhD in Information Technology and Pedagogic Sciences, the Herzen State Pedagogical University of Russia, St. Petersburg, 1989; Doctor degree: Doctor of Pedagogic Sciences and Information Technology, the Herzen State Pedagogical University of Russia, St. Petersburg, 1999. Dr. Gorbunova, Full Professor, PhD in Sc., Doctor of Pedagogic Sciences, Chief Researcher of the Education and Methodological Laboratory Music Computer Technologies of the Herzen State Pedagogical University of Russia, St. Petersburg.

She was on a number of business trips abroad, among them working trip to the USA (1999, 2003); lecturing and giving research and practice seminars in Hungary (2003, 2005, 2017); business trip to the UK (2016, 2019); she was a member of the Jury of national and international competitions of musical creativity, including Bridge of Friendship (Dortmund, Germany, 2011), etc. Work experience; 1990 – 2010 - Associate Professor, Professor of the Department of Information Technology of the Herzen State Pedagogical University of Russia, St. Petersburg; 2010 – present - Full Professor of the Department of Information Technology, Institute of Computer Science and Technological Education of the Herzen State Pedagogical University of Russia, St. Petersburg; 2002 – present - Chief Researcher of the Educational and Methodological Laboratory Music Computer Technologies of the Herzen State Pedagogical University of Russia, St. Petersburg. She has more than 300 scientific publications, among them are monographs Music Computer Technologies: Theoretical and Practical Aspects (St. Petersburg: Publ. house “SMIO Press” (2007, 560 pp.) and Music Computer Technologies: The Problem of Modeling the Process of Musical Creativity, compiled with participation of S.V. Chibirev (2012); course book Information Technology in Music, vol. 1 – 4; vol. 1, Architectonics of musical sound (2009), vol. 2, Musical Synthesizers (2010), vol. 3, Music Computer (2011), Music, Mathematics and Computer Science, vol. 4, compiled with participation of M.S. Zalivadov (2013). Her research activities include such directions as: MCT in professional music 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 modelling 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.

Prof. Dr. Gorbunova is Chairperson of the Organizing Committee of the International Research and Practice Conference Contemporary Music Education, Chairperson of the Organizing Committee of the International Research and Practical Conference Music Computer Technologies in the System of Contemporary Education. 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 / St. Petersburg), International Festivals and Competitions Musical Electronics and Multimedia (Moscow / Saint-Petersburg), Clarine of the 21st Century (St. Petersburg), The World of Art without Borders (St. Petersburg, Russia - Szeged, Hungary), Bridge of Friendship (Dortmund, Germany), All-Russian Competition of Electroacoustic Music DEMO (St. Petersburg). She is a member of Editorial Boards of International Journals: Music Scholarship / Problemy Muzykal'noy Nauki (WoS, Scopus), The World of Science, Culture, Education / Mir Nauki, Kult`ury, Obrazovaniya, Electronic international scientific journal of music and sound in electronic mass media, film, Internet, and multimedia Mediummusic. Prof. Dr. Gorbunova has developed first ever course in Music, called Music Computer Technologies, which has been offered under the Bachelors of Arts and Sciences (BAsc), , which in 2004 carried out student recruitment in different regions and educational institutions of Russia and she also leads post-graduate courses "Music Computer Technologies in Education" available under the MA in Music Education, since 2006. Prof. Dr. Gorbunova supervises a number of doctoral and post-doctoral students (more than 30) and lectures on Music Computer Technologies and Information Technology in Music. She supervises research in various directions, among them there are: Theory and history of culture, Music Art, Information system and processes, Theory and methodology of professional education, Mathematical modelling, numerical methods and program systems, Theory and methods of education and upbringing (in Music, Informatics, natural sciences). The research results of Prof. Gorbunova were published in over 300 refereed publications including 48 books and 255 papers in journals and conference proceedings. Awards and honors: 2003 - Gold medal of the all-Russian Exhibition Centre (former VDNKh); 2005 - Silver medal of the all-Russian Exhibition Centre (former VDNKh); 2009 - Gold medal of the all-Russian Exhibition Centre (former VDNKh); 2009 - Diploma of the winner in the nomination «New educational technologies in ICT environment» of the all-Russian creative contest of scientific-technical solutions, educational products and services in the field of Informatization of the innovative-educational complex «Music computer technologies in the system of modern education»; 2010 - Grand Prix of International Congress-exhibition «Global Education - Education Without Borders» (2010) - Diploma of the 11th all-Russian forum «Educational environment - 2010» for the project «Digital educational resources «Music computer technologies in education» in nomination of «Creative Competition of scientific developments, innovative solutions and programs in the field of higher vocational education» and many others; 2011 - Laureate of the Prize of the Government «For Outstanding Achievements in the Field of Higher and Secondary Professional Education»; 2013 - Honorary Worker of Higher Professional Education of the Russian Federation.

Olga L.Yasininskaya was born in St. Petersburg, Russia. Graduated from the Herzen State Pedagogical University of Russia (St. Petersburg); PhD student of the Herzen State Pedagogical University of Russia under the guidance of Prof. Irina B. Gorbunova. She is an author of a number of articles published in different research journals. Since 2014, she has been working as a sound engineer at the Education and Methods Laboratory Music Computer Technologies of the Herzen State Pedagogical University of Russia, St. Petersburg.