# METATECHNOLOGY AS A WAY OF INTEGRATION OF INFORMATION, LINGUISTIC AND ARTISTIC MILIEUX OF EDUCATION IN THE SYSTEM OF GENERAL EDUCATION WITH THE USE OF MUSIC COMPUTER TECHNOLOGIES

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**Abstract -** The article highlights the pedagogical experience of the process of integration of information, linguistic and artistic means of education in the system of general education on the example of secondary school with in-depth study of subjects of the musical cycle and English; the process of implementation of integration of information and artistic means of education in the system of general education with the use of contemporary music computer technologies as one of the tools in the formation of information educational environment of the school aimed at achieving new educational results by all participants of the educational process is illustrated; metatechnology of formation of values of through (continuous) education by means of modern creative digital educational environment is presented.

**Index Terms -** General education,information educational environment,interactive educational technologies, music computer technologies.

## I. INTRODUCTION

Training of educated and intellectually developed generation as the most important condition for sustainable development and modernization of the society is a priority task of contemporary education, the question of methodological and methodological support of this process naturally arises.

For example, the popularization of scientific knowledge and ideas in the scientific and entertainment museum centers, giving an opportunity to participate in experiments, experiments and other cognitive activities, have become one of the trends of the contemporary museum-pedagogical process, and the creation of large-scale children's technology parks, allowing children to conduct independent research activities, created the preconditions for the introduction of a new standard of additional education in large cities and regions.

However, the school remains the place where the child spends most of the school day and receives additional education. In some cases, this hinders the possibility of development due to the weak technological equipment and (or) the lack of appropriate methodological developments, visual tutorial, maquettes, models and other materials that expand the information educational space.

As a result, school education is in dire need of opportunities to conduct both scientific and educational, and project activities at a level close to such centers, but, if possible, on their own and without attracting large-scale funding.

## II. ADDITIVE EDUCATIONAL TECHNOLOGIES

With the advent and mass availability of additive technologies, the Internet and free software, it becomes possible to create a digital educational environment that integrates knowledge, methodological and other developments in this area. They are created in an easily replicated format that allows each educational institution, each child or adult to take advantage of the ready development of didactic educational or other developmental materials based on additive technologies, as well as to offer their own development created in a high-tech digital educational environment. The idea of such developments is not new and was present in the Russian scientific and technical periodicals in the form of "do it for school" sections, working as an excellent motivational tool for future researchers.

Development of additive technologies and licensing is Open Source spawned similar projects in the foreign language segments of the Internet (for example, www.thingiverse.com, myminifactory.com), but they are focused not only on educational objectives, and community people dedicated to the additive technologies, and as a result do not have the methodological developments in the use of the proposed projects there in training activities. The proposed project integrates specific pedagogical experience and contributes to the creation of a high-tech creative educational environment that allows teachers and pupils to share not only technical developments, but also ways to use them in educational institutions.

## III. SYNTHESIS OF GENERAL AND ADDITIONAL EDUCATION OF PUPILS AT SECONDARY SCHOOLS

The introduction of a new effective model of synthesis of general and additional education of children by one educational institution, available for replication in various educational institutions and provides a joint effort of teaching staff, parents and pupils to form a system of accelerated development of children's technical and creative abilities (often – in their relationship) allows training future engineers, scientists, representatives of creative professions. Pupils' motivation to receive high-tech and engineering professions is a possibility to develop creative abilities and realize the values of continuous education. The active inclusion in this process of music computer technologies (MCT), digital arts and the possibilities of modern digital creative educational environment will also allow forming a new type of specialists capable of active creative activity within the conditions of functioning of network infrastructure and digital technologies [1]-[3].

Among the main objectives of our project, which allows implementing of the synthesis of general and additional education of pupils in one educational institution, we highlight the following:

1) to teach the pupil to identify and obtain the necessary information (development metatechnology-learning) in modern digital educational environment;
2) to teach the skills of self-motivation, self-regulation and self-understanding (practical development of psychotechnologies-application of "instructions to the human body");
3) to teach an effective communication (teamwork) and effective problem solving (metatechnological art — technology of inventive problem solving, in Russian "TRIZ").

Pupils' skills:

- self-motivation,
- ability to learn (self-learning),
- self-regulation,
- self-understanding,
- inventiveness,
- ability to work in a team.

## IV. PROJECT DESCRIPTION "MAKE-4-SCHOOL»

Digital educational space "MAKE-4-SCHOOL" is:

- environment for accelerated development of technical and creative abilities of children;
- space for creative and methodical interaction;
- stimulus for the formation of inventive thinking;
- advanced technologies of development of the child's personal orientations;
- a new educational format for children in the field of engineering, based on the integration model of the dissemination of technological knowledge, creative design and team activities.
- The project consists of two complementary parts, involving joint the development for over several years and the translation of experience to other educational organizations.

**Part one. Innovative laboratory**

The forces of pupils of School no. 8 "Music" in the framework of extracurricular activities have already assembled a 3D printer project Prusa3, repeatedly upgraded and is they are working on at the creation of large-format 3D printer of their own design based on printed parts using the concept of RepRap. The devices are abundantly used in the course of "Music Computer Technologies" for prototyping musical instruments of original designs, wind instruments mouthpieces and other elements used in the educational process. One or even two 3D printing devices for the development of 3D models on the scale of the planned projects is not enough. Currently, free software OpenScad and Blender are being used for their implementation, which works well on low-power computers, but it hinders the development of pupils' engineering and design skills; educational versions of professional software, the corresponding hardware and additional software are installed.

**Part two.Methodical website development MAKE-4-SCHOOL.RU**

A digital educational environment is being created and it describes the activities of the innovation laboratory and methodological developments that arise both in the process of pupils' joint work and in the framework of free exchange on the Internet, the implementation of joint projects with foreign partners and the methodological segment that allows broadcasting the experience of successful projects not only of School no. 8 "Music", but also of other participants in the educational process.

For example, it is proposed to implement a pedagogically new approach to teaching children musical literacy, focused on the modern child, brought up largely under the influence of computer logics and aesthetics. In particular, the inclusion of MIDI-keyboard in music lessons in secondary school allows you to provide maximum opportunities for each pupil's creative activity, regardless of his musical abilities [4]-[8].

The difference is that the study of computer science in a school with in-depth study of musical disciplines can be built on materials related to music. Thus, in practice, we implement meta-methodical technology (meta-methodical approach) and inter-subject integration: musical computer (MC) creates the necessary framework for effective music lessons using MC [9]-[10] as a learning tool at the lesson.

## V. USING THE MUSIC COMPUTER TECHNOLOGIES IN THE PROJECT

Active inclusion of MCT in the educational process allows achieving the following learning goals:

- obtaining new sustainable educational results taking into account the specifics of the changing society and its modern needs;
- creation of an integrated digital learning environment;
- formation of pupils' activity research approach to understanding of knowledge;
- mastering the ability to use computer technology as a practical tool for working with the use of MCT;
- formation of pupils' ability of independent formulation and finding a solution to creative problems, critical attitude to existing information and intellectual involvement in the desired problem;
- education of pupils with active position to knowledge.

The use of MCT in the activities of a contemporary teacher-musician involves the following tasks:

- to include in the system of schoolchildren's music education modern technologies of sound reproduction;
- to significantly expand the set of information and illustrative materials available for pupils and teachers in the classroom and outside the classroom [11]-[12];
- to improve the quality of the material presentation and make it more interesting and attractive to pupils compared with traditional textbooks;
- to support the creative and research work of pupils and teachers, etc.

Computer musical creativity is a means of formation of information competence of both the pupil and the contemporary teacher-musician [13]–[15].

In addition to solving these priorities, the use of MCT and electronic musical instruments allows the application of computer services that greatly facilitate the work of the teacher and the pupil: a quick search for information, the preservation of intermediate results and its results, automatic verification of test tasks, etc. Based on the best examples of classical music, with the help of a set of programs developed by us, the introduction of MCT into the educational process corresponds to the contemporary level of education [16]–[19].

## CONCLUSION

The article presents the experience of implementation of the integration process of information, linguistic and artistic means of education in the system of general education on the example of secondary school with in-depth study of music cycle and English allows you to create a model of synthesis of children's general and additional education by one educational institution, available for replication in various educational institutions.

The process of integration of information and artistic means of education in the system of general education with the use of contemporary music computer technologies as one of the tools in the formation of high-tech educational creative environment of the school, aimed at achieving new educational results by all participants of the educational process is illustrated. Metatechnology of the formation of values through (continuous) education using the tools of digital creative educational environment (media) is set out.

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