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FORMATION AND DEVELOPMENT OF STUDENTS' GRAPHIC LITERACY IN THE PROCESS OF WORKSHOP CLASSES ON TECHNICAL MODELING

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У статті розглянуто сутність, практичну значимість та специфіку процесу формування і розвитку графічної грамотності вихованців у ході занять гуртка технічного моделювання в освітньому середовищі закладу позашкільної освіти науково-технічного напряму початково-технічного профілю. На основі аналізу програмного забезпечення практичної графічної діяльності вихованців визначено технологічну послідовність виконання графічних завдань, педагогічні умови якісного засвоєння вихованцями основ графічної грамотності засобами гуртових занять. Практично доведено ефективність впливу гуртової роботи з технічного моделювання на оволодіння графічною мовою дітьми молодшого шкільного та підліткового віку під час розв'язання графічних завдань, що диференційовані за рівнем складності.

Дидактично обґрунтовано необхідність оволодіння вихованцями основами політехнічної освіти шляхом графічної діяльності під час конструювання моделей технічних об'єктів як базису для подальшої профілізації і самовизначення гуртківців з конкретною технічною галуззю знань і напрямом особистого саморозвитку.

Схарактеризовано методичні аспекти організації форм освітньої діяльності, специфіку використання методів, прийомів, технологій, підходів, прийомів навчання, що сприяють формуванню і розвитку графічної грамотності вихованців. Визначено мотиваційний чинник занять як основний фактор розвитку інтересу вихованців до графічної, конструкторської, проектної діяльності, отримання власного практичного досвіду творчої праці й реалізації своїх вподобань в освітньому динамічному середовищі закладу позашкільної освіти. Встановлено, що системне залучення до графічної діяльності вихованців гуртка початкового технічного моделювання за власним покликанням у ході змістовно наповненого дозвілля і водночас якісно організованого освітнього процесу, в результаті використання особистісно зорієнтованого й діяльнісного підходів, педагогічного супроводу керівника гуртка сприяє формуванню найважливіших пізнавальної, практичної, соціальної, творчої компетентностей особистості дитини, які є необхідними для продовження навчання в технічних гуртках за профілями науково-технічного напряму.

Результативність участі вихованців гуртків у багатьох технічних змаганнях, виставках, конкурсах з конструювання та запуску діючих найпростіших технічних моделей міського, обласного, всеукраїнського рівнів доводить високий і достатній рівень оволодіння графічною грамотою вихованцями гуртків початкового технічного моделювання. Проаналізовано твердження педагогів закладів позашкільної освіти, методистів, батьків, показниками статистичних досліджень, згідно яких ґрунтовна графічна підготовка вихованців у ході гуртових занять з початкового технічного моделювання допомагає підвищенню успішності навчання в загальноосвітньому навчальному закладі, сприяє особистісному розвитку і самовизначенню дітей, виконує роль початкової політехнічної освіти учнів.

Ключові слова: *освітній процес закладу позашкільної освіти, гурткова робота, графічна грамотність, графічна діяльність, графічні завдання.*

The paces of socio-economic development of the state, the reform of the educational industry in the modern information environment predetermine the evolution of means of

information transmission. From the first days of life the child is surrounded by technical devices, sign systems, gadgets, drawings, schemes and other images that fill his/her living space. In addition to the sound, for practical human activity, we can distinguish the need to learn graphic language in the process of personal development and mastering the younger generations of life competencies, which will determine their future professional orientation.

The institutions of extracurricular education effectively promote the achieving of these goals in the educational space of our state. The primary link, which lays the foundation of graphic technical literacy of students, is the student's workshops of technical modeling for the initial technical profile of the scientific and technical direction of extracurricular education. The educational opportunities of the workshop activity from the initial technical modeling help to eliminate the contradiction between the need for mastering the graphic literacy and insufficient level of motivation to study, since the workshop activity is in free time from school, is not obligatory, is chosen by the child in accordance with the circle of interests; the complexity of the graphic material and the non-traditional, practical, personal approach to the processing of such material in the process of educational activity in the relaxed environment of the institution of extracurricular education.

Theoretical, practical bases and conceptual foundations of educational activity of institutions of extracurricular education are considered in the researches of O. Bykovska, I. Bekh, V. Verbytskyi, T. Yevtukhov, H. Pustovit O. Melentiev, V. Sukhomlynskyi, T. Sushchenko, S. Rusova, T. Tsvirov. The investigations of psychological aspects of graphic skills formation is carried out in works of A. Botvinnik, T. Buhaiov, O. Halkina, P. Halperin, L. Hurova, A. Zankov, Ye. Kabanova-Meller, V. Kurina, V. Krutetskyi, V. Moliako, S. Rubinshteina, I. Yakymanskoi and others. The problem of studying the methodical ways of forming graphic skills and abilities of primary school pupils is disclosed in scientific researches of domestic and foreign scientists such as V. Vasenko, N. Bondarieva, D. Samarin, V. Polenichko, O. Litkovets. However, the issues of formation of students' graphic literacy during workshop classes from the initial technical modeling in the educational environment of institutions of scientific and technical direction of extracurricular education remain insufficiently researched.

The low level of formation of graphic preparation causes difficulties in further education of students in profile workshops of the scientific and technical direction of extracurricular education and in vocational schools. Therefore, urgent need is to do a didactic substantiation of the essence, meaning, volume and didactic conditions of formation of graphic literacy of students in the course of workshop classes from the initial technical modeling in institutions of scientific and technical direction of extracurricular education.

The significance of graphic literacy in the content of learning is driven by the need for the child to navigate and understand environmental information for use in multi-faceted activities. A. Botvinnikov emphasized its importance, arguing that the requirements for scientific and technical training of individuals constantly increase according to the evolution of modern technical means, automation of production and numerous fields of human activity [7, C. 9].

Graphic literacy is the ability to read various graphic images (symbols, drawings, diagrams, technical drawings, etc.) and the skills of their construction (execution) with the help of various drawing tools, as well as by hand or on the eye [2, C. 5].

The general level of graphic preparation of children of elementary school age is determined by the content of the school course in the study of educational disciplines of mathematics, fine arts, labor education is the basis for further development and improvement of graphic literacy in the process of workshop activity in institutions of extracurricular education.

But, as practice shows, most children have a low level of mastery of graphic arts at the initial stage of attending workshop classes.

The main content of the students' graphic training is outlined in the curricula of the workshop of initial technical modeling of the scientific and technical direction of the initial technical profile of extracurricular education on the basis of which the educational process is planned. Formation of graphic literacy among students of the workshop is defined as the main task and factor of the predicted result of development of practical competence in the process of studying in the workshop of initial technical modeling.

The analysis of the software clarifies the essence of the tasks of mastering graphic literacy in accordance with the initial and basic levels and the years of training is to familiarize students with the main drawing tools, concepts of lines and sections, symbols - bending lines, lines of visible contours, places of glue, formation of the concept symmetry axis, symmetry axis, symmetric cutting, etc. [6, С. 27]. Practically significant is the processing of the above graphic concepts in the analysis of sample drawings, sweeps and the creation of technical objects and models with their own hands. The final stage of making things is necessarily a game, an exhibition work in which students use graphic concepts, can explain them during a dialogue, demonstration, competition.

The analysis of the contents of workshop classes and the mechanisms of organizing other forms of educational activity of the groups of initial technical modeling give grounds to assert that the graphic image originally arises mentally, in the imagination of the child, and only then is embodied in a specific graphic construction. Graphic activity of the students of the workshop of initial technical modeling has an expanded range of possibilities for mental development. In the process of practical graphic work of students there is an intensive development of thinking, close interaction of attention, perception, imagination, memory, their spatial representations, cognitive abilities simultaneously with the formation of their own experience of creative activity, working out of abilities and skills.

During the introductory part of the lesson, students analyze images, drawing details, scans and ready-made bench models of technical objects in order to distinguish their properties, important elements. As a result, in the imagination of the child forms a voluminous graphic image from which the next stage of work begins – the construction of his own technical model, which has specific characteristics, functions, adaptations determined by the child. As a result of such meaningful step-by-step work in the mind of the pupil develops the formation of a holistic information-filled image, which in fact, is the psychological foundation of graphic activity. In accordance with the workshop scheme 2/3 of the work time, pupils are covered by practical activities for the production of a technical object in the process of performing technological operations and graphic tasks.

Consequently, the graphic task is considered as «an educational problem that involves the conditional reflection of the spatial properties of an object through mental and practical actions, which are based on certain knowledge of the rules of execution and preparing drawings, schemes, sketches and the ability to apply them in practice» [3, С. 20]. Such tasks serve as the main means of mastering graphic literacy by students of the workshop by performing an algorithm of analytical and synthetic actions in accordance with the content of classes. Analysis of the system of graphic tasks that are performed by the students in the process of mastering graphic literacy gives grounds to assert that the practical realization of the task fulfills the need of each child in applying the obtained theoretical knowledge to their own practical activities, serves as a tool for the formation of technological skills and abilities of children, acts as a motivator of the dynamic inclusion of those who are learning in the process of knowledge and performing mental activities during the educational process.

With the help of the use of modern teaching methods and computer software, students of the first and second years of elementary level of education from almost the first lessons, despite the low level of development of the skills of drawing the technical objects on paper, achieve a qualitative result by performing construction in a special program 3-D KOMPAS, which, in addition, saves time for the intermediate preparatory stage of work. As a result, students do not get tired of monotonous work and are able to continuous creative search for the achievement of the educational goal.

In the course of comprehensive monitoring of pupils' activities covered by the process of performing graphic tasks, a technological sequence of work on graphic tasks was determined:

1. Familiarization with work samples, analysis of the conditions for the implementation of the task, identifying the necessary features to be achieved (characteristic of the bending lines, the places of application of glue, finishing elements).

2. Discussion of the technological sequence of performing graphic operations on the basis of drawing, scheme, technological card, own demonstration by the leader of the circle.

3. Independent practical activity of pupils (individual or group) for the support and individual counseling, assistance of the head of the circle.

4. Summing up and correction of the result, finding out the reasons for the non-conformity of the model with the stated conditions, eliminating errors, making revisions, analysis of non-standard creative decisions, exhibition of works.

The content of the graphical tasks performed in the course of the training lessons helps the students during the observation and the phased making models to disassemble, understand and practically execute the mechanism of constructing technical objects using means of work, to master the technical elements, and as the result to obtain the initial polytechnic education.

Consider the process of performing graphic training for students and gradually track the specificity, effectiveness and content of the performed graphic tasks is proposed in the context of studying the section of the curriculum workshop of the initial technical modeling [6, C. 27] «Initial graphic knowledge and skills» within the theme «Familiarization with the symbols of the bending line, the line of visible contour, the line of incision, the cutting, the place of application of glue. Making a box-postcard».

At the initial stage of students' perception the motivational factor plays the role of self-determination of the child in achieving its specific goal during the classroom is noteworthy. This factor is the contemplation of the final result of work - samples of a finished box-postcard. Consequently, one of the obligatory conditions for the effectiveness of further activities is the selection by the head of the workshop of tasks that are interesting to the students of a particular contingent and the possibility of using the model proposed for the student's life in the context of communicating with the immediate environment: family, friends, school realization, the possibility of self-expression – the creation of its unique model, which has never been before, the need to feel a co-creator, achieve success. In preparation for the class, during the selection of graphic tasks, the execution of samples of boxes, the leader of the workshop takes into account the level of formation of skills among the pupils with tools and materials, differentiates them on the complexity, volume of work, filling and searching for graphic decisions regarding the sex of children.

Accordingly, at the first stage of the implementation of the technological sequence of work under the direction of the head of the workshop children contemplate objects-samples, content filling and purpose, their functionality, analyze the shape, size, level of complexity of execution, color decision, design elements, choose the model that most like it. At the end of the first stage, each pupil is determined with a specific form of the model of the box-card, which he decided to make and selects the required elements to be used in constructing the model (text, image location, use of bulk details). In fact, in the process of using the project method, pupils

create their own sketches and attempt to correlate the level of complexity of their implementation, their capabilities, get advice from the head of the circle.

The second stage of work takes place on the basis of consideration of a technological card, a graphical scheme, familiarization with a video or an individual presentation and a commentary on the actions performed by the head of the circle, and aimed at understanding the children by step-by-step implementation of the tasks and content of each technological step. Actually at this stage, before starting to work with the pattern of the box-postcard, the attached symbols of the bending lines mentioned in the topic are considered, as well as they relate to the understanding of the implementation of which the labor action is directed at certain lines, thus forming the skills of reading graphical information. During this graphic activity, the implementation of the main cognitive learning function is realized.

At the beginning of independent practice (third stage) in the student's mind there is a clear image and understanding of the sequence of implementation of technological operations, and the process of implementing the image of the box model into life begins. The degree of complexity of implementation of technical and graphic operations, depending on the individual characteristics and skills of students is regulated by the head of the workshop level of his assistance. To those students who will work with the pattern for the first or for the second time, it is suggested to bend the already formed bending lines, but not to form them with a self-written ballpoint pen, the beginning of the cutting is laid out with a stationery knife. The means of realization of graphic tasks are tools (ruler, triangle, pencil, rod of spit ballpoint pen, scissors, pencils, etc.), and materials (scan boxes, colored paper, quilting strips, colored napkins, dried flowers, etc.). Students' favorite stage is the creative third one, and especially the process of graphic design of the carcass of the box with the help of stylistic means of decorative and applied art as a type of graphic art. With accordance to the previous sketch, the students place a flower on the bottom of the box, or the butterfly simply graphically depicting its image with pencils, paints, using the technique of «decoupage», «trimming», «quilling», which are already familiar to them. The artistic and graphic activity is continued with the image of selected greetings, the performance of a volume decoration made of dried roses of orange crusts, bows, or vice versa, with images of cars or other vehicles, buttons and chocolate candies

The final fourth stage of graphic activity is the characteristic of the result obtained by the head of the workshop and has poly-dimensional significance. The exhibition of students' works demonstrates the personal achievement of each student and points to the level of formation of graphic skills and abilities of children, the possession of a conceptual apparatus. During communication with each student through the presentation of the model there was a discussion of successful creative artistic and graphic decisions of the made model of the box and correction of the mistakes that had been made. The practice of verbal assessment of students is aimed at perceiving the child's own success, synthesizing the need for further hard work on oneself, as a path to constant self-improvement during communication. Due to the systematic execution of graphical tasks during the practical part of the classes, the number of fulfilled exercises provides qualitative changes in the formation of graphic literacy of students, accompanied by the expansion of imagination, concentration of attention, activation of the speed of mental processes: comparison, the separation of main features, synthesis of own findings, creative search.

The educational process of workshop lessons from the initial technical modeling is aimed at mastering pupils of junior school age and younger teens the basics of graphic literacy: formation of abilities and skills development of constructive construction of technical objects, reading of graphic sign systems in the process of working on creating a model, working out own experience in observance of the proportion, volume, color combination, knowledge of the basics of design, which forms the basis for further creative development and successful self-

realization in the process of continuing education in sports, information, production, artistic and technical workshops of the scientific and technical profile of extracurricular education.

Among the most important conditions that contribute to the qualitative process of mastering graphic literacy by the students should note the interest, active motivation to teach children by the head of the workshop, the use of game interactive techniques, forms and methods, their diversity in the educational process, the informational saturation of the educational material, the ability to choose by each pupil graphic tasks of different levels of complexity within the framework of the subject under consideration, systematic thorough preparation for the occupation and graphic literacy of the head of the workshop but, the dynamics of changes in the types of activity of students during the class, the possibility of using the manufactured technical model, toys, decorative choices in the student's life by participating in competitions, as a gift to others, use in everyday life, decoration of the room, etc.

Due to the systematic involvement in the graphic activity of the students of the workshop of initial technical modeling according to their vocation, during content-rich leisure and at the same time well-organized educational process, as a result of the use of personality-oriented and activity approaches, pedagogical support of the head of the workshop is the formation of the most important cognitive, practical, social, creative competences of the student's personality, which are necessary for continuing education in technical workshops by profiles on scientific and technical direction.

The effectiveness of the participation of students in various technical competitions, exhibitions, contests on the design and launch of the most simple technical models of the urban, regional, and all-Ukrainian levels proves the high and sufficient level of mastering graphic literacy by students of the workshops of initial technical modeling. According to the statements of teachers of institutions of extracurricular education, methodologists, parents and indicators of statistical research, – the thorough graphic preparation of students during workshop lessons from the initial technical modeling helps to increase the success of studying at a general educational institution, promotes personal development and self-identification of children, plays the role of elementary polytechnic education of students.

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KOZYROD O.

FORMATION AND DEVELOPMENT OF STUDENTS' GRAPHIC LITERACY IN THE PROCESS OF WORKSHOP CLASSES ON TECHNICAL MODELING

In the article the essence, practical significance and specificity of the process of formation and development of students' graphic literacy during the studies of the workshop classes on technical modeling in the educational environment of the institution of extracurricular education of the scientific and technical direction of the initial technical profile are considered. In the article the essence, practical significance and specificity of the process of formation and development of graphic literacy of students during the classes of technical modeling circle in the educational environment of the institution of extracurricular education of the scientific and technical direction of the initial technical profile are considered. On the basis of software analysis, practical graphic activity of the students, we determine a technological sequence of graphic tasks, pedagogical conditions of qualitative mastering of the basics of graphic literacy by means of workshop classes. It was practically proved that the efficiency of the impact of workshop work on technical modeling on graphic language acquisition by children of junior school and teenage age during solving graphic tasks differentiated by the level of complexity. It was didactically grounded that the need for students to master the basics of polytechnic education through graphic activity during the design of models of technical objects as a basis for further profiling and self-determination of themselves with a specific technical branch of knowledge and a direction of personal self-development. The methodical aspects of the organization of forms of educational activity, the use of methods, techniques, technologies, approaches, methods of teaching that promote the formation and development of graphic literacy of students are described. We determined the motivational factor of classes as the main factor of development of interest of students to graphic, designing, project activity, obtaining own practical experience of creative work and realization of their preferences in the educational dynamic environment of the institution of extracurricular education.

Keywords: *workshop activity, educational process of the institution of extracurricular education, graphic literacy, graphic activity, graphic tasks.*

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