Assessment of the pedagogical and psychological criteria for aesthetic education of middle and high school students

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Abstract. The purpose of the present study is to test and determine the effectiveness of the unique method for quantifying the aesthetic and psychological criteria of aesthetic education of middle and senior school-age students. This method allows conducting a group study on the criteria of aesthetic education of students for a limited time (one academic hour). The results allow performing a comparative analysis of the level of aesthetic education of individual students on certain criteria of aesthetic education in general (as well as on the components of these criteria), and conducting a comparative analysis of the aesthetic education between individual groups. The method is based on the use of some already known techniques of psychological diagnosis of teenagers and young persons, developed by R.S. Nemov, as well as methods for researching the activity of thinking by I.M. Lushikhina. The new interpretive schemes of well-known methods proposed by the authors allow quantifying not only the cognitive abilities of students, but also assessing the level of development of their visual skills. The latter is particularly important because, when combined with a quantitative assessment of the social criterion of aesthetic upbringing, it provides the most complete picture of the level of aesthetic development of students at a certain period.

1 Introduction

There are many definitions of aesthetic education in modern pedagogical literature [1-5]. In our opinion, the main drawback of the definitions of aesthetic education is the lack of direct instructions: how to consider the age, mental and sensory properties of a child's (or student's) personality.

Meanwhile, it is the age specificity that gives them a specific pedagogical meaning and allows them to organize and to correct the process of aesthetic education methodically. In our opinion, aesthetic education is a pedagogically organized and purposeful process of pedagogical interaction, taking into account the natural inclinations, the specifics of the leading activities and sensitive prerequisites for the mental development of students, aimed at developing their abilities to aesthetic perception and experience of reality, the formation of aesthetic taste and the need for active creative activity. However, aesthetic education as a process associated with a specific child's personality is variable in nature. A temporary

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"slice" of the state of this process in relation to a particular child's personality (or even a group of students) is aesthetic education. Aesthetic education can be defined as the result of aesthetic mentoring, as the level of development of the emotional, axiological, cognitive, and creative activity spheres of the student's personality, which characterizes it in a certain period. It is also important to note that in the above definition of aesthetic education, it is determined by a temporary factor, and, therefore, should always be determined not only by the psycho-age characteristics of the child's personality, but also by the pedagogical goals of aesthetic education at this stage of the educational process.

The purpose of our study is a theoretical justification and an experimental test of the effectiveness, adequacy and reliability of the system of methods of quantifying the aesthetic education of students between the ages of 13 and 17 (inclusive).

The main drawback of the existing methods used for assessment of the level of aesthetic education of students is their one-sidedness. This is reflected in the fact that they are either technological in nature, i.e. aimed at establishing the level of development of a specific group of skills, or are purely appraisal, as expressed in their extreme subjectivism.

The proposed system of quantitative assessment of aesthetic education is focused on a comprehensive and holistic study of the personal qualities of middle and older schoolchildren based on a combination of different methods, which allows expressing estimates in a points system, accessible by verification methods of mathematical statistics.

In developing the system of quantifying the aesthetic education of schoolchildren, we focused on the theoretical provisions concerning the structure and content of aesthetic education, proposed by B.T. Likhachev [1]. We also used the practical methods of psycho-diagnosis of children and adolescents by R.S. Nemov [6-7] and I.M. Lushikhina [8]. This circumstance was due to the fact that we consciously chose those methods that have already passed the test of time and proved their effectiveness. We saw our task as to form a new system of quantitative assessment criteria of aesthetic education based on the known psycho-diagnostic techniques, adding a pedagogical interpretation as well as the methods scoring components of the social criteria of aesthetic education. To learn more about the methods of evaluating the social criterion of aesthetic education, see our previously published articles [9-10].

In addition, when planning and conducting the experimental part of the study concerning statistical analysis of the results, we followed the recommendations of D.A. Novikov [11-12], as well as I.A. Kolesnikova [13-14], and S.V. Silchenkova [15-16].

2 Materials and methods

The basis of practical confirmation of the effectiveness of our proposed system of quantification of psychological and pedagogical criteria for aesthetic education of schoolchildren, as well as the reliability of the data we have obtained was the assumption that the psychological and educational characteristics we studied are more pronounced in students of art schools (children's art schools) than in secondary schools in general. In our view, this assumption is due to two circumstances. First, students of art schools have more pronounced makings, predisposition to the occupation of fine art, and, secondly, the system of additional education of aesthetics and artistic orientation contributes to the development of these makings and appropriate psychological and educational properties. Thus, to confirm the methodology developed by us, we conducted two series of studies - among students of secondary schools and among students of art schools (AS) with a subsequent comparison of the results on the relevant characteristics.

The theoretical basis of our system of methods of assessing the aesthetic well-being of schoolchildren was the meaningful characteristics of the criteria of aesthetic upbringing, formulated by B.T. Likhachev [1]. B.T. Likhachev singled out three groups of criteria of

aesthetic upbringing of children and adolescents: psychological, pedagogical, and social. Psychological criteria are related to the child's ability to reproduce in imagination and implement in practice (artistic creativity) artistic images, as well as to emotionally experience them and to express their attitude to them. Pedagogical criteria contribute to the formation of an aesthetic ideal, make it possible to establish "the level of artistic and imaginative thinking and creative imagination", evaluate "the ability to create your own, new, original image, as well as skills of creative activity". It follows from the above that the psychological and pedagogical criteria are closely related. Moreover, it can be argued that they are based on similar mental processes (such as memory, thinking, attention, imagination, a level of speech development). Pedagogical criteria are determined by the level of development of visual skills, the ability to create in practice, that is, to embody in real creativity their artistic ideas. Thus, the main task of our research was, first, to get the necessary and sufficient information about the psychological and pedagogical properties of students that interest us, and, second, to confirm the reliability of the results obtained on the basis of their statistical analysis, as well as by comparing the indicators of students in secondary schools (SS) and art schools (AS).

The methodology proposed includes psychological (testing) and pedagogical (analysis of students' creative works, assessment of the level of development of visual skills, performance technique and artistic skill) methods of assessing the criteria of aesthetic education of students. At the heart of psychological methods, as mentioned above, are methods of psychological diagnosis of teenagers and young people, R.S. Nemov, but not in full, only those that are directly related to visual activities. The pedagogical interpretation of these methods was mainly reduced to value judgments about the level of development of graphic (visual) skills on a three-point scale ("low", "medium" and "high" levels).

The first three tasks are related to the diagnosis of different types of memory - short-term visual, medium-term visual and mediated memory. The good development of these types of visual memory implies a high ability to imagination. In addition, the importance of medium-term visual memory is that it allows storing and using the information that is necessary to find the right solution to the problem, which is especially important for those students who are actively engaged in visual and decorative arts. The mediated memory is related to the student's ability to associate the visual image with the verbal, which also implies the development of his imagination and graphic (visual) skills.

The first task is related to determining the volume of short-term visual memory. This technique is that students were offered 20 seconds to memorize a table with 16 images of different subjects. The task was to draw the images remembered into an empty matrix table. If it is not possible to draw an image, students were allowed to write its name in the corresponding table. The psychological criterion was evaluated by counting the number of correctly reproduced images (taking into account the location in the table), including the names of images. The pedagogical criterion was evaluated only by the number of correctly drawn images.

We suppose that this task allows evaluating not only the psychological, but also the pedagogical component. Experience shows that the correctness of the performance by the students of this task depends not only on the degree of development of his or her short-term memory. Correct reproduction of the picture indicates the level of development of the student's necessary graphic (visual) skills, which make up the gist of the pedagogical criterion of aesthetic education. In this case the evaluation of the pedagogical criterion is expressed in the scores - by the number of correctly depicted segments and proximity of the general outline of the picture to the original.

The second task is aimed at diagnosing the operational visual memory. The essence of this technique is that teenagers are offered to memorize four task cards with images of six different shaded triangles. After viewing the cards, children are given a matrix, including

24 numbered triangles. The task is that children must consistently correctly find and specify in the matrix triangles (their numbers) located on four job cards. The job is estimated by the number of correctly specified triangles.

The third method (the diagnosis of the mediated memory) is as follows. The tester reads aloud the words and sentences: "a home", "a stick", "a tree", "to jump high", "the sun shines", "a fun man", "children play a ball", "a clock doesn't work", "a boat floats on the river," "a cat eats fish". After reading each a word or a sentence, a pause is made for 10-20 seconds, during which the child should have time to portray something that will help him to remember the right words and sentences. The correctly reproduced word is rated at one point, approximately - 0.5 points, incorrectly - 0 points. The amount of points is rounded up to an integer.

The fourth method is a method of researching the activity of thinking, developed by I.M. Lushychina [8]. In this case, the attention is paid to the study of the dynamic characteristics of thinking processes, such as fluency and flexibility. Both techniques are related to a person's ability to solve intellectual problems. The fluency of thinking is related to the ability to solve problems by overcoming, i.e. by weeding out wrong, erroneous options, and the flexibility of thinking is associated with the ability to solve intellectual problems by converting abstract objects (images or words) into the kind that is necessary according to the task (flexibility of thinking is associated with the associativeness of thinking). In this method, students are invited in one minute to add to 12 circles (or triangles, squares, etc.) other elements so they should get drawings on a certain topic (water, sports, recreation, study, etc.).

The psychological criterion was assessed according to the formula: $P = P_{inv} / 12 \cdot 10$, where P_{inv} is the number of invented stories, 12 – the maximum number of options.

The evaluation of the pedagogical criterion is made on the following grounds: the speed of the imagination processes; the unusualness, originality of the images; the richness of the imagination; the depth and elaboration (detailing) of the images.

For each of these characteristics, depending on the degree of its severity, the student receives from 0 to 2 points. When determining figurative flexibility, the subject is asked to draw as many drawings as possible in one minute using certain elements (crown, heart, "lightning", etc.). The criteria for evaluating the results of psychological and pedagogical criteria are the composition, the drawing technique, the movement transfer, the plasticity, and the laconism of the graphic image. Assessments of psychological and pedagogical criteria are based on the same principle as when evaluating imaginative flexibility.

The fifth method is "The Raven Matrix". It is aimed at studying visual and figurative thinking. In this technique, the child is offered a series of tasks of the same type: to find patterns in the arrangement of details on the matrix and to pick up one of the eight data below the drawings as an insert to the matrix. No more than 10 minutes are given for all tasks. Each correctly solved task is estimated at 1 point.

The application of mathematical statistics methods in studies of the criteria of aesthetic education of middle and high school students.

The question of the fundamental possibility of using statistical methods in pedagogical research still has no clear solution. In planning the experimental part of our study, related to the use of statistical methods in order to verify the quantitative assessments obtained, we relied on the theoretical provisions presented in the works of I.A. Kolesnikova [13-14] and S.V.Silchenkova [15-16]. Thus, according to these authors, the effectiveness of the use of statistical methods in pedagogical studies primarily depends on the type of this study. I.A. Kolesnikova divides all pedagogical studies into two groups: humanitarian (which studies the value components of pedagogy, or cultural phenomena in education) and technocratic (technological), suggesting information-education, normative and educational, "chronological-quantitative" work: "A technological effectiveness is the ability to make a

high degree of action with a high degree of probability to make a planned change." [13]. However, if the task of the pedagogical study, regardless of its type, is to study the similarity and differences in samples on any basis, the application of statistical criteria for testing the hypothesis of similarity of samples is considered a prerequisite for its effectiveness. In most humanitarian studies, however, a combination of quantitative (statistical) and qualitative methods, which are diverse in techniques and based on subjective, appraisal judgments, should be used.

In the case of the goals and objectives of our study, it can be argued that the study of psychological and pedagogical criteria of aesthetic education of schoolchildren belongs entirely to the technological type, as it is aimed at studying similarities and differences in samples on certain grounds.

As mentioned above, when choosing the method of statistical analysis of the quantitative assessments obtained, we took advantage of the recommendations of D.A. Novikov, outlined in the work "Statistical Methods in Educational Studies" [12]. The statistical method used in a specific pedagogical research should correspond to the type of experimental data obtained. According to the recommendations of D.A. Novikov [12], if the experimental data are obtained as a result of measurements in a serial scale, and if the number of gradations (different scores) is higher, or equal to three, then it is necessary to use the criterion of homogeneity χ^2 , which was practically implemented.

Thus, one of the ways to confirm the effectiveness of the proposed system of assessing the criteria for aesthetic education of schoolchildren is experimental confirmation of the intragroup similarity of levels of aesthetic education of students of one age group (students of SS between themselves and students of AS and SS among themselves), as well as confirmation of the intergroup differences of the relevant indicators (the results of the study of the criteria of aesthetic education).

3 Results

The main method of research (evaluation) of psychological criteria of aesthetic education of schoolchildren is testing. However, in addition to the main method, supportive methods such as observation and conversation were also used in the study. The results of these methods, although not included in the bulk of the data, have since helped to interpret the results correctly.

A total of 153 students between the ages of 13 and 18 participated in the study. They are 73 students of secondary schools of the Serebryano-Prudsky district of the Moscow region: "The Serebryano-Prudskaya Secondary Comprehensive School named after Marshal V.I. Chuykov" and "The State-farm Secondary School" from Ouspensky town, Serebryano-Prudsky district, as well as 80 students of children's art schools and art schools in the Moscow region: Serebryano-Prudskaya art school named after A.D. Kivshenko, Shchukovskaya Children's School of Art, Reutovskaya Children's School of Art, Balashikhinskaya Children's School of Art No.1 named after G.V.Sviridov as well as the Children's School of Arts of the Stupinsky Municipal District. The study was conducted between 2018 and 2019.

In accordance with the scores scored in each age group of students, we have allocated three levels of psychological criterion assessments: "Low" - from 0 to 25 points inclusive; "Medium" - from 26 to 30 points; "High" - 30 points or more.

Table 1. Percentage of estimates by the levels of psychological criterion of aesthetic education.

Group	Level	Quantity	Total	Share (%)
Ss	Low	14	73	19
	Medium	31		42
	High	28		38
As	Low	12	80	15
	Medium	14		18
	High	54		68

Fig. 1. Histogram 1 which is graphically represents Table 1 data Where: 1 - low, 2-medium level, 3 - high level.

The study of the pedagogical criterion of aesthetic education of students in secondary schools and art schools was carried out simultaneously with the study of the psychological criterion, so the composition of the groups of students in both cases almost coincided.

In accordance with the scores we have identified three levels of assessment of psychological criteria: "Low" - from 0 to 8 points inclusive; "Medium" - from 9 to 10 points inclusive; "High" – over 10 points.

Table 2. The percentage of ratings for the levels of the pedagogical criterion of aesthetic education.

Group	Level	Quantity	Total	Share (%)
Ss (older group)	Low	50	73	68
	Medium	11		15
	High	12		17
As (older group)	Low	12	80	15
	Medium	15		19
	High	53		66

Fig. 2. Histogram which is graphically represents Table 2 data. Where: 1 – low level, 2-medium level, 3 - high level.

4 Discussion

The results of our research on the aesthetic education of secondary school and art school students indicate that all relevant characteristics of pedagogical and psychological criteria indicators of art school students exceed the corresponding indicators of secondary school students. This circumstance not only shows the effectiveness of the proposed method of quantitative evaluation of criteria for aesthetic education, but also confirms the reliability of the research results.

Experience has shown that the proposed system of methods can serve as a reliable means of objective control of aesthetic development of schoolchildren and therefore can be used for both group and individual research.

The re-research conducted has shown that increasing the level of aesthetic education of students has a positive effect on the dynamics of their social activity, the development of their creative abilities.

5 Conclusions

The results of the research allow drawing the following conclusions:

- The proposed system of quantifying the psychological and pedagogical criteria for the aesthetic education of schoolchildren between the ages of 13 and 17 meets the requirements of adequacy and reliability of the data obtained.
- This system is applicable for both individual and group studies.
- Implementation of this system does not require special training of people who carry out the research, its implementation does not require serious material and time costs, does not harm the educational process. These circumstances make it suitable for use in real pedagogical practice (both in secondary schools and in the system of additional education of children of aesthetic orientation).
- The data obtained from the study are of pedagogical importance, as they allow assessing the level of development of important psychological and educational characteristics of individual students, and conducting comparative studies of separate groups of students. This circumstance is relevant not only for determination of the effectiveness of aesthetic

education in a corresponding educational institution, but also allows methodically correctly and purposefully individualizing the pedagogical work.

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