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Thus, based on Kapp and Sheldon's study findings, it can be concluded that games provide teachers with an ability to improve the efficacy of the teaching process. They allow for increased student participation. They are successful in addressing significant shortfalls in conventional teaching methods [19, 20]. Moreover, in the era of globalization, computer games are getting more and more popular, and Kazakhstan, as a part of a global world is to employ all of the new approaches and methods.

According to the literature analyzed during the research, games are one of the most important means of mental and moral education of learners. Especially elementary level learners are in need of being engaged to the lesson, they have to be entertaining. Thus, didactic method of teaching can evoke positive motivation for learning, as well as strengthen obtained knowledge. They can deepen the desire to learn more and be integrated to master all of the language skills.

Thus, the introduction of gaming technology in English classes of elementary level learners plays a vital role. According to the analyzed works, the use of gaming technology has a positive impact on the formation of intercultural competence among students, allows them to focus on the main thing - mastery of speech skills in the natural conversational situation.

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NONPARAMETRIC METHODS OF STATISTICS IN THE ANALYSIS OF THE RESULTS OF THE EXPERIMENT

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ABSTRACT

When analyzing experimental data, a number of important typical problems arise. These include, in particular, tasks such as checking the homogeneity of two numerical sets, checking the randomness of elements of an experimentally obtained numerical set, checking the independence of elements obtained experimentally with a numerical set, and the like. These problems are formulated in the form of statistical hypotheses.

In this paper, we focus on the so-called non-parametric statistical methods of testing statistical hypotheses. In particular, methods such as the Wilcoxon method, the sign method, and the series method are considered.

The paper reveals the essence of these three criteria for testing statistical hypotheses. The relation of these criteria to the normal law of distribution of a random variable is shown. We support the theoretical schemes with specific examples, in particular, taken from our pedagogical experiment.

Keywords: sample, parent population, random variable distribution, main hypothesis, alternative hypothesis, statistic criterion, Wilcoxon criterion, sign criterion, series criterion.

Introduction.

When analyzing the results of the experiment, the distribution of parent population may be unknown. Therefore, the use of known parametric methods of statistics is unacceptable. In this case, methods that are independent of the nature of parent population distribution are used, these are so-called non-parametric methods.

We consider such known non-parametric methods as the Wilcoxon method, the series method, and the sign method [1]. This applies to both the initial and final stages of the experiment.

Nonparametric methods do not involve the use of numerical sampling values, but only the use of structural properties of the sample (for example, the order ratio between their elements etc.). It is clear that some part of the information, contained in the sample, is lost. This means that the power of nonparametric methods is less than the power of parametric ones. Nonparametric methods, however, can be applied to more general distribution assumptions and are simpler in terms of computational work.

Nonparametric methods are used to test the hypothesis of belonging of two samples $x_1, x_2, ..., x_{n_1}$ and $y_1, y_2, ..., y_{n_2}$ to the same parent population, that is, the hypothesis that the distribution functions $F_1(x)$ (for a random variable X) and $F_2(x)$ (for a random variable Y) are equal: $F_1(x) \equiv F_2(x)$.

Such parent populations are called homogeneous. A necessary condition for homogeneity is the equality of the numerical characteristics of the studied parent populations, including mean values, variances, medians etc. As a basic assumption, when using nonparametric criteria, only the continuity of parent populations distribution is taken.

We consider the simplest criteria of this type - *the sign criterion, the series criterion, the Wilcoxon criterion*.

Main part.

1. ***The sign criterion***. The task of testing the main hypothesis H_0 of the homogeneity of parent populations for their paired samples arises, for example, when comparing two methods of determining the same indeks. When exploring each of the n objects by the first and second methods, certain numerical values x_i and y_i ($i = 1, 2, ..., n$) are obtained respectively.

If you compare the samples obtained from homogeneous populations, then the values x_i and y_i are interchangeable, and therefore the probability of occurrence of positive and negative differences $x_i - y_i$ are equal. The probability of zero differences occurrence is equal to zero, because of continuity of parent population distribution. (Indeed, if X is a continuous random variable which value is x_i, Y is a continuous random variable which value is y_i, but y_i is a fixed value resulting from the measurement, then

$$P(x_i - y_i = 0) = P(x_i = y_i) = P(X = y_i) = 0$$

because the probability of acquiring a fixed value by a continuous random variable X is equal zero.)

Thus

$$P(x_i - y_i > 0) = P(x_i - y_i < 0) = 1/2, \; i = 1, 2, ..., l,$$

where l is the number of nonzero differences, $l \le n$. Zero differences can appear due to random errors or approximate calculus and therefore the pairs that correspond to them are removed from consideration.

The *sign test statistic* is the number of «+» or «–» in the sequence of sign differences $(x_i - y_i), \; i = 1, 2, ..., l$. For certainty we can agree to take into account, for example, the number of signs «+».

Provided that the main hypothesis H_0 is true, and the experimental pairs of numbers $(x_i; y_i)$, and hence the signs of difference $x_i - y_i$ are independent, then the number of signs «+» has a binomial distribution with the parameters $p = 1/2$ and l. Therefore, the task is to test the main hypothesis

$H_0 : p = 1/2$ for one of the alternative hypotheses:

$$H_1 : p > 1/2 \text{ or } H_1 : p < 1/2 \text{ or } H_1 : p \neq 1/2.$$

Let r be the number of received signs «+» and α is the level of significance. If $H_1 : p > 1/2$ and the inequality holds:

$$\sum_{i=r+1}^{l} C_l^i (1/2)^l < \alpha, \tag{1}$$

then the hypothesis H_0 is rejected; if $H_1 : p < 1/2$ and the inequality holds:

$$\sum_{i=0}^{r} C_l^i (1/2)^l < \alpha, \tag{2}$$

then the hypothesis H_0 is rejected; if $H_1 : p \neq 1/2$ and one of the inequalities holds:

$$\sum_{i=r+1}^{l} C_l^i (1/2)^l < \alpha/2 \text{ or } \sum_{i=0}^{r} C_l^i (1/2)^l < \alpha/2, \tag{3}$$

then the hypothesis H_0 is rejected too.

If for these alternative hypotheses the corresponding inequalities $(1)-(3)$ are not fulfilled, then the hypothesis H_0 does not contradict the results of observations and is accepted at the level of significance α.

Often the hypothesis $H_0 : p = 1/2$ is tested using known Fisher statistics.

If $H_1 : p > 1/2$ and the inequality holds

$$F_{\exp} = \frac{r}{l - r + 1} \geq F_{\kappa p}(\alpha; k_1, k_2), \tag{4}$$

where $k_1 = 2(l - r + 1)$, $k_2 = 2r$, $F_{cr}(\alpha; k_1, k_2)$ – the critical point of Fisher distribution [1], then hypothesis H_0 is rejected.

If $H_1 : p < 1/2$ and inequality holds:

$$F_{\exp} = \frac{l - r}{r + 1} \geq F_{\kappa p}(\alpha; k_1, k_2), \tag{5}$$

where $k_1 = 2(r + 1)$, $k_2 = 2(l - r)$, then hypothesis H_0 is rejected.

If $H_1 : p \neq \frac{1}{2}$ and one of the inequalities holds:

$$F_{\exp} = \frac{r}{l - r + 1} \geq F_{cr}(\alpha/2; k_1, k_2) \text{ or } F_{\exp} = \frac{l - r}{r + 1} \geq F_{cr}(\alpha/2; k_1, k_2),$$

then hypothesis H_0 is rejected too.

For example, consider two related (equal volumes) samples as a result of a study using two methods:

x_i	42	65	60	53	75	85	70	45	55	44
y_i	43	68	62	52	76	80	70	47	53	45

Using the sign criterion, taking the level of significance $\alpha = 0{,}1$, let us show that the two samples are homogeneous.

The sequence of difference signs $x_i - y_i$ is as follows:

$$-, -, -, +, -, +, 0, -, +, -.$$

The number of non-zero differences is equal $l = 9$, and the number of positive differences is equal $r = 3$. We test the hypothesis that the differences in the results are caused by random errors, that is, we test the hypothesis $H_0 : p = 1/2$.

An alternative hypothesis is that the results of the second method have a positive deviation; in other words, the probability of a positive difference should be less then $1/2$. Therefore, the alternative hypothesis is: $H_1 : p < 1/2$.

We use inequality (5) to test the hypothesis $H_0 : p = 1/2$. Primarily, we have

$$k_1 = 2\cdot(3+1) = 8,\ k_2 = 2\cdot(9-3) = 12,\ F_{\exp} = \frac{9-3}{3+1} = 1{,}5.$$

Since according to the table of critical points of Fisher statistics we have $F_{cr}(0{,}1;8;12) = 2{,}24$, then the hypothesis does not contradict the results of observations. It must be assumed that the differences in the results of these two samples are caused by random errors, so the parent populations X, Y are homogeneous.

2. S*eries criterion*. Series criterion is used to test the main hypothesis H_0 of randomness and independence of the sample items.

Let be $x_1, x_2, \ldots, x_n$ the sample of the results of observations, $\bar{h}_X$ – the median of this sample. Each sample element is assigned in accordance a "+" or "–" sign, depending on whether the element is greater or less than the median (zero values are not taken into account).

Denote by n_1 the number of signs "+" and by n_2 – the number of signs "–". Therefore, some set (sequence) of signs is matched to the whole sample.

A series in this set is referred to as any sequence consisting of the same signs and bounded by the same signs on either side or at the end or beginning of this set. For example, the set

$$+-+++-----++++$$

contains 5 series:

$$(+),(-),(+++),(-----),(++),\ n_1 = 8,\ n_2 = 6.$$

Series criterion statistics is the number of series N. The critical region is determined by the inequalities $N \le N_1$ and $N \ge N_2$. Therefore, provided $N_1 < N < N_2$ the main hypothesis is accepted. The values of the boundaries and the critical region at a given level of significance are given in the corresponding tables of the *series criterion*. The critical points of the *series criterion,* at the level of significance $\alpha = 0{,}05$, we present in the form of table 1. In this table $k_1 = \max\{n_1, n_2\}$, $k_2 = \min\{n_1, n_2\}$.

Table 1

k_2	k_1															
	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
2	– –	– –	– –	– –	– –	– –	– –	2 –	2 –	2 –	2 –	2 –	2 –	2 –	2 –	2 –
3	– –	2 –	2 –	2 –	2 –	2 –	2 –	2 –	2 –	2 –	3 –	3 –	3 –	3 –	3 –	3 –
4	2 9	2 9	2 –	3 –	3 –	3 –	3 –	3 –	3 –	3 –	3 –	4 –	4 –	4 –	4 –	4 –
5	2 10	3 10	3 11	3 11	3 –	3 –	4 –	4 –	4 –	4 –	4 –	4 –	4 –	5 –	5 –	5 –
6		3 11	3 12	3 12	4 13	4 13	4 13	4 13	5 –	5 –	5 –	5 –	5 –	5 –	6 –	6 –
7			3 13	4 13	4 14	5 14	5 14	5 14	5 15	5 15	6 15	6 –	6 –	6 –	6 –	6 –
8				4 14	5 14	5 15	5 15	6 16	6 16	6 16	6 16	6 17	7 17	7 17	7 17	7 17
9					5 15	5 16	6 16	6 16	6 17	7 17	7 18	7 18	7 18	8 18	8 18	8 18
10						6 16	6 17	7 17	7 18	7 18	7 18	8 19	8 19	8 19	8 20	9 20
11							7 17	7 18	7 19	8 19	8 19	8 20	9 20	9 20	9 21	9 21
12								7 19	8 19	8 20	8 20	9 21	9 21	9 21	10 22	10 22
13									8 20	9 20	9 21	9 21	10 22	10 22	10 23	10 23
14										9 21	9 22	10 22	10 23	10 23	11 23	11 24
15											10 22	10 23	11 23	11 24	11 24	12 25
16												11 23	11 24	11 25	12 25	12 25
17													11 25	12 25	12 26	13 26
18														12 26	13 26	13 27
19															13 27	13 27
20																14 28

Let's check, for example, whether the sequence of numbers 31, 39, 40, 45, 27, 28, 35, 55, 21, 33, 42, 36 can be considered random if the significance level is accepted $\alpha = 0,05$.

Record the sample in the form of a variation series: 21, 27, 28, 31, 33, 35, 36, 39, 40, 42, 45, 55. Then the sample median $\bar{h}_B = \dfrac{35+36}{2} = 35,5$. The following set of signs corresponds to the following set of observations:

$$-, +, +, +, -, -, -, +, -, -, +, +,$$

where $n_1 = 6,\ n_2 = 6$, the number of series $N = 6$. According to the table of values of the *series criterion* statistics, for the level of significance $\alpha = 0,05$ we find $N_1 = 3,\ N_2 = 11$. Since $N_1 < N < N_2\ (3 < 6 < 11)$, then the main hypothesis H_0 is accepted: the received sequence consists of random numbers.

For a large samples, when $n_1 > 20$ or $n_2 > 20$ or $n_1 > 20$ and $n_2 > 20$, statistics U can be used to test the hypothesis H_0. The experimental values of these statistics are calculated by the formula:

$$u_{\exp} = \left(N - \frac{2n_1 n_2}{n_1 + n_2} \right) - \frac{1}{2} \Big/ \sqrt{\frac{2n_1 n_2 [2n_1 n_2 - (n_1 + n_2)]}{(n_1 + n_2)^2 (n_1 + n_2 - 1)}}.$$

If the hypothesis H_0 is true, then the distribution of statistics U is close to normal, where the mathematical expectation is $M(U) = 0$, the variance $D(U) = 1$. In this case, the critical region is determined by inequalities: $u_{\exp} \le u_{left\ cr}$ or $u_{\exp} \ge u_{right\ cr}$, where $u_{right\ cr} = u_{(1-\alpha)/2}$, $u_{left\ cr} = -u_{(1-\alpha)/2}$.

3. ***Wilcoxon criterion***. Let two independent samples of different volumes be checked for homogeneity. That is, let X and Y be continuous random variables, and

$$x_1, x_2, ..., x_{n_1}, \tag{6}$$

$$y_1, y_2, ..., y_{n_2}, \tag{7}$$

their independent sample volumes n_1 and n_2, respectively.

Testing the hypothesis about the homogeneity of samples (6) and (7) can be performed according to the Wilcoxon criterion (*W* - criterion).

The main hypothesis is that for all values of the argument (here the argument is always denoted by *x*), the distribution functions $F_1(x)$ (for a random variable X) and $F_2(x)$ (for a random variable Y) are equal: $F_1(x) = F_2(x)$.

Alternative hypotheses are as follows:

$$F_1(x) \ne F_2(x),\ F_1(x) < F_2(x),\ F_1(x) > F_2(x).$$

Immediately note that accepting the alternative hypothesis $H_1:\ F_1(x) < F_2(x)$ means that $X > Y$, because an integral distribution function is nondecreasing. Similarly, the validity of the alternative hypothesis H_1:

$$F_1(x) > F_2(x), \text{ means that } X < Y.$$

Further, we consider that in samples (6) and (7) $n_1 \le n_2$.

1st case, when the volumes of both samples do not exceed 25.

In order to test, for the significance level α, the main hypothesis $H_0 : F_1(x) = F_2(x)$ of the homogeneity of two independent samples (6) and (7) of volumes n_1 and n_2 ($n_1 \le n_2$), for the alternative hypothesis $H_1 : F_1(x) \ne F_2(x)$, we must proceed in the following way:

1) record both samples as a single variation series (in ascending order) and find in this series $w_{\exp}$ – the sum of the sequence numbers of the first sample members (smaller samples);

2) we find the left critical point of the W criterion according to the Wilcoxon criterion table

$$w_{left\ cr}(Q, n_1, n_2), \text{ where } Q = \alpha / 2;$$

3) we find the right critical point by the formula

$$w_{right\ cr} = (n_1 + n_2 + 1) n_1 - w_{left\ cr}.$$

If $w_{left\ cr} < w_{\exp} < w_{right\ cr}$, then there is no reason to reject the main hypothesis. If $w_{\exp} < w_{left\ cr}$ or $w_{\exp} > w_{right\ cr}$, then the main hypothesis is rejected.

Remark 1. For the alternative hypothesis: $F_1(x) > F_2(x)$, you need to find the left critical point $w_{left\ cr}(Q, n_1, n_2)$, where $Q = \alpha$. If $w_{\exp} > w_{left\ cr}$, then there is no reason to reject the main hypothesis. If $w_{\exp} < w_{left\ cr}$, then the main hypothesis is rejected.

For the alternative hypothesis: $F_1(x) < F_2(x)$, you need to find the right critical point $w_{right\ cr} = (n_1 + n_2 + 1)n_1 - w_{left\ cr}$, where $Q = \alpha$. If $w_{\exp} < w_{right\ cr}$, then there is no reason to reject the main hypothesis. If $w_{\exp} > w_{right\ cr}$, then the main hypothesis is rejected.

Remark 2. If several members of the sample are equal, they are assigned ordinal numbers in the total variation series as if the members were different. If the members of different samples are equal, they are all assigned the same serial number, which is equal to the arithmetic mean of the ordinal numbers, which would have had these members to coincide.

2nd case, where the volume of at least one of the two samples exceeds 25.

To test the main hypothesis $H_0 : F_1(x) = F_2(x)$ for the significance level α on the homogeneity of the two independent samples (6) and (7) of the volumes n_1 and n_2 ($n_1 \le n_2$) for the alternative hypothesis $H_1 : F_1(x) \ne F_2(x)$, we must proceed in the following way:

1) from equality: $\Phi(z_{cr}) = (1-\alpha)/2$ we find the number z_{cr} by the Laplace function $\Phi(z)$ table [2];

2) we find the left critical point from equality:

$$w_{left\ cr}(Q, n_1, n_2) = \left[\frac{(n_1 + n_2 + 1)\cdot n_1 - 1}{2} - z_{cr}\sqrt{\frac{n_1 n_2 (n_1 + n_2 + 1)}{12}} \right], \quad (8)$$

where $Q = \alpha/2$; $[a]$ – the integer part of a;

3) we find the right critical point by the formula

$$w_{right\ cr} = (n_1 + n_2 + 1)n_1 - w_{left\ cr};$$

If $w_{left\ cr} < w_{\exp} < w_{right\ cr}$, then there is no reason to reject the main hypothesis. If $w_{\exp} < w_{left\ cr}$ or $w_{\exp} > w_{right\ cr}$, then the main hypothesis is rejected.

For the alternative hypothesis $F_1(x) < F_2(x)$ or $F_1(x) > F_2(x)$:

1) the number z_{cr} is found from equality: $\Phi(z_{cr}) = (1-2\alpha)/2$;

2) accepting $Q = \alpha$ from (8) we find the left critical point;

3) by the formula: $w_{right\ cr} = (n_1 + n_2 + 1)n_1 - w_{left\ cr}$ we find the right critical point;

If $w_{left\ cr} < w_{\exp} < w_{right\ cr}$, then there is no reason to reject the main hypothesis.

If $w_{\exp} < w_{left\ cr}$ or $w_{\exp} > w_{right\ cr}$, then the main hypothesis is rejected.

The criterion described was applied to test the statistical hypothesis on homogeneity of the experimental and control groups of students when studying the communicative competence of future managers. Let us describe one of the episodes of this study.

Control and experimental groups of students (№ 1 and № 2) were involved in the experiment. We have taken into account the grades for students entering the university.

For group № 1 of volume $n_1 = 78$, the following sample was:

707, 703, 702, 700, 699, 697, 691, 687, 687, 686, 684, 678, 673, 672, 672, 671, 670, 670, 668, 664, 662, 658, 657, 654, 649, 646, 646, 645, 645, 643, 641, 641, 640, 640, 639, 638, 638, 637, 637, 632, 631, 629, 629, 628, 626, 624, 623, 623, 622, 621, 620, 615, 614, 608, 608, 607, 606, 605, 603, 602, 601, 601, 599, 597, 597, 597, 596, 595, 584, 584, 582, 578, 572, 569, 568, 550, 548, 540.

The mean value of this sample is $\overline{x}_1 = 632,96$, the sample mean squared deviation $-\sigma_1 = 39,46$, $\Sigma x_1 = 49371$, $n_1 = 78$.

For group № 2 of volume $n_2 = 74$, the corresponding sample was as follows:

720, 708, 707, 692, 689, 687, 684, 684, 683, 680, 679, 678, 675, 672, 670, 669, 668, 665, 660, 659, 656, 655, 652, 651, 650, 649, 648, 645, 645, 645, 644, 644, 643, 642, 642, 642, 641, 640, 640, 639, 638, 638, 637, 634, 633, 629, 629, 627, 625, 624, 624, 622, 620, 617, 616, 614, 612, 610, 606, 604, 603, 601, 600, 598, 597, 592, 587, 585, 583, 574, 570, 565, 547, 544.

The mean value of this sample is $\overline{x}_2 = 637,12$, the sample mean squared deviation $\sigma_2 = 36,74$, $n_2 = 74$, $\Sigma x_2 = 47147$.

Therefore, the mean values and the mean squared deviations of both samples are respectively close numbers.

We formulate *the main hypothesis*: the two samples are homogeneous, that is, both samples have the same distribution.

Alternative hypothesis: the two samples are not homogeneous.

Для перевірки правильності основної гіпотези вибираємо рівень значущості $\alpha = 0,05$.

To test the validity of the basic hypothesis, select the level of significance $\alpha = 0,05$.

For received samples, the total variation series is as follows:

720, ***708***, 707, ***707***, 703, 702, 700, 699, 697, ***692***, 691, ***689***, ***687***, 687, 687, 686, 684, ***684***, ***684***, ***683***, ***680***, ***679***, ***678***, 678, ***675***, 673, 672, ***672***, 672, 671, 670, 670, ***670***, ***669***, ***668***, 668, ***665***, 664, 662, ***660***, ***659***, 658, 657, ***656***, ***655***, 654, ***652***, ***651***, ***650***, ***649***, 649, ***648***, 646, 646, 645, 645, ***645***, ***645***, ***645***, ***644***, ***644***, ***643***, 643, ***642***, ***642***, ***642***, ***641***, 641, 641, 640, 640, ***640***, ***640***, ***639***, 639, 638, 638, ***638***, ***638***, ***637***, 637, 637, ***634***, ***633***, 632, 631, 629, ***629***, ***629***, 629, 628, ***627***, 626, ***625***, ***624***, ***624***, 624, 623, 623, 622, ***622***, 621, 620, ***620***, ***617***, ***616***, 615, 614, ***614***, ***612***, ***610***, 608, 608, 607, ***606***, 606, 605, ***604***, ***603***, 603, 602, 601, 601, ***601***, ***600***, 599, ***598***, ***597***, 597, 597, 597, 596, 595, ***592***, ***587***, ***585***, 584, 584, ***583***, 582, 578, ***574***, 572, ***570***, 569, 568, ***565***, 550, 548, ***547***, ***544***, 540.

The sum of the ordinal numbers for the sample members of group № 1 is equal to 5777, and for the group № 2 this sum is equal to 5785. Since in this situation the sample volumes are equal to $74 = n_1 \le n_2 = 78$, then we need to take it $w_{\exp} = 5785$.

Since $\alpha = 0,05$, then from equality $\Phi(z_{cr}) = (1-\alpha)/2 = (1-0,05)/2 = 0,475$ by the table of values of the Laplace function, we obtain $z_{cr} = 1,96$.

We find the boundaries of the critical region for variable w. Since $n_1 = 74$, $n_2 = 78$, $w_{\exp} = 5785$, $\alpha = 0,05$, then

$$w_{left\ cr}(Q, n_1, n_2) = \left[\frac{(n_1 + n_2 + 1)\cdot n_1 - 1}{2} - z_{cr}\sqrt{\frac{n_1 n_2 (n_1 + n_2 + 1)}{12}} \right] =$$

$$= \left[\frac{(74 + 78 + 1)\cdot 74 - 1}{2} - 1,96 \cdot \sqrt{\frac{74 \cdot 78 \cdot (74 + 78 + 1)}{12}} \right] =$$

$$= [5660,5 - 532,709] = 5128,$$

where $[a]$ is an integer part of a. From here we get the right boundary of the critical region

$$w_{right\ cr}=(n_1+n_2+1)n_1-w_{left\ cr}=(75+78+1)74-5128=6194.$$

Since $5128<5785<6194$, i.e. $w_{left\ cr}<w_{\exp}<w_{right\ cr}$, then the main hypothesis of sampling homogeneity is accepted. Therefore groups № 1 and № 2 are homogeneous.

Conclusion. Our task was to demonstrate, in an accessible form, some of the simplest methods of testing statistical hypotheses that emerge in the process of analyzing an experiment. We support the theoretical schemes with specific examples, in particular, taken from our pedagogical experiment. The author hopes that the work may be useful to those who are faced with the task of mathematically substantiating the conclusions when processing the experimental data.

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РАЗВИТИЕ РЕЧЕВЫХ НАВЫКОВ У СТАРШЕКЛАССНИКОВ ЧЕРЕЗ РАССКАЗЫВАНИЕ ИСТОРИЙ

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DEVELOPMENT OF SPEAKING SKILLS OF HIGH SCHOOL STUDENTS THROUGH STORYTELLING

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АННОТАЦИЯ

Автор описывает авторскую модель структуры речевой компетенции в рассказах подростков, молодежи и взрослых о себе, которая состоит из четырех блоков: актуализирующего, мотивационного, инструментального и индивидуального стиля. Мы анализируем экспериментальные данные о динамике и характере содержания актуализирующих и мотивационных блоков в трех изученных возрастах, как акмеологическую предпосылку непрерывного развития. Речевой аппарат ребенка в начале дошкольного возраста полностью сформирован, но имеет некоторые особенности: голос короче, чем у взрослого, гортань также почти вдвое длиннее; менее гибкий и подвижный язык, он занимает вдвое большую часть полости рта, чем у взрослого. Недостаточно функционирует центральный аппарат слуха и речи, расположенный в коре головного мозга. Это приводит к тому, что ребенок часто недостаточно тонок, чтобы различать звуки речи на слух, а движения его речевых органов еще недостаточно скоординированы.

ABSTRACT

The author describes the author's model of the structure of speech competence in the stories of teenagers, young people and adults about themselves, which consists of four blocks: actualizing, motivational, instrumental and individual-style. We analyze experimental data concerning the dynamics and nature of the content of actualizing and motivational blocks in the three studied ages, as an acmeological prerequisite for continuous development. The speech apparatus of a child at the beginning of preschool age is fully formed, but has some features: the voice is shorter than that of an adult, the larynx is also almost half as long; the less flexible and mobile language, it occupies twice as much of the oral cavity as that of an adult.

Insufficient functioning of the central apparatus of hearing and speech located in the cortex of the brain. This leads to the fact that the child is often not subtle enough to distinguish the sounds of speech by ear, and the movements of his speech organs are not yet coordinated enough.