Gniezińska Anna, Bar Karol. The analysis of sports results obtained by pupils in Primary Schools Championships in Katowice in swimming in the years 2012 – 2016. Journal of Education, Health and Sport. 2018;8(11):328-336. eISNN 2391-8306. DOI
http://dx.doi.org/10.5281/zenodo.1490543
http://ojs.ukw.edu.pl/index.phpohs/article/view/6304

The journal has had 7 points in Ministry of Science and Higher Education parametric evaluation. Part B item 1223 (26/01/2017).
1223 Journal of Education, Health and Sport eISSN 2391-8306 7

The authors declare that there is no conflict of interests regarding the publication of this paper.

Received: 25.10.2018. Revised: 25.10.2018. Accepted: 18.11.2018.

The analysis of sports results obtained by pupils in Primary Schools Championships in Katowice in swimming in the years 2012 – 2016

Anna Gniezińska[1]*, Karol Bar[2]

[1]The Jerzy Kukuczka Academy of Physical Education in Katowice, Katowice, Poland

[2]The Jerzy Kukuczka Academy of Physical Education in Katowice, Katowice, Poland

*Corresponding author: Anna Gniezińska, The Jerzy Kukuczka Academy of Physical Education in Katowice, Kłodnicka 72/15, 40-705 Katowice, Poland. anna.gniezinska@op.pl

ABSTRACT

Aim of study: The objective of the study was to analyze the sports results of pupils from primary schools in Katowice over five years.

Methodology: The research was conducted in the years 2012-2016. Results were gathered over the last five years from the pupils swimming competitions in primary schools in Katowice. The study included together 290 third grade pupils aged 8-10 years old and sixth grade girls and boys aged 12-13 years old. The research was conducted on a 25 m swimming pool in Interschool Sports Centre in Katowice. For the research were used the method of data analysis documentaries. Secondary data sets have been examined. The results of the 25m freestyle and 50m freestyle swimming competition held in 2012-2016 have been analysed.

Results: For the analysis of obtained data were used statistics descriptive which include the mean ± standard deviation (SD), Min-Max range, the coefficient of variation, skewness and kurtosis, an analysis of variance (ANOVA). The shape of the trend changes over time and the prediction were made by using regression, setting trends in linear and non-linear. The level of significance 0.05.

Conclusions: In the most diverse group of boys occurred in 2011/2012 at a distance of 25 m, and the distance of 50 m. In the group of girls greatest variability was observed in years 2015/2016 at the distance of 25 m and 50 m. The diversity at both distances tested was higher in girls group than in boys. The best average time for the girls was in the years 2013/2014

at a distance of 25 m, and in 2014/2015 at a distance of 50 m. The boys over a distance of 25 m achieved the best average times in the years 2013/2014 and for a distance of 50 m in the years 2012/2013.

Key words: analysis of sports results, swimming

Scientific discipline: Physical Education

Introduction

The ability to swim reaches probably the beginning of human being history. The art of staying on water was once primarily utilitarian, needed for hunting and fishing. In ancient Greece, swimming was trained for the harmonious development of human body (Karpiński 2002, p. 8). The first organized swimming classes took place in ancient Rome and were treated as one of the mean that lead to proper physical development. Information about methods of swimming teaching appeared in the book "Float" developed by Mikołaj Wynman published in 1537. Then in 1587, Everard Digby's book "The Art of Swimming" appeared. In the 18th century, Schools of Swimming was established almost all over Europe. In 1794, Oronzio De' Bernardi, an Italian author, presented the first basics of swimming in the book "L'uomo galleggiante, o sia, L'arte ragionata del nuoto, scoperta fisica" (The Floating Man or the Reasoned Art of Swimming) (Karpiński, 2002).

In recent years swimming has been developing dynamically and is becoming more and more popular as a sport discipline, as well as a form of recreation and physical rehabilitation. Swimming strengthens muscles and joints, respiratory and circulatory system, tempers the body. The results obtained by the swimmer is a measure of the sports level of a swimmer. Sports achievements depend on training and genetic determinants of children. Swimming training is a long-term and staged process.

As Alicja Stachura et al. (2012) notes, the effectiveness and speed of the swimming teaching process depends on factors such as: motor skills, motor skills, level of physical development, teacher's competence and personality, emotional state and choice of teaching method. A good teacher and trainer should based on a swimming results plan, which is a list of intended learning outcomes. Must make a diagnosis, analysis of sports base, sports equipment. Training loads of school-aged pupils must be properly selected and dosed so that they do not interfere with the natural development of children. At the age of 8-10, even the most difficult elements of technique are easily mastered. Swimming competition in primary schools are organized to increase children's interest in this sport. Pupils should feel the joy of practicing it. Teachers and trainers must encourage young people to have a healthy lifestyle. Health and full physical fitness are an attribute of individual happiness. (Strzyżewski 1996, p.22). Pupil competition is the best form of selection for recruitment to the swimming sections.

Due to the interest in the topic concerning the field of swimming, the authors have reviewed the literature related to research issues, but unfortunately have not found current research on the results of primary school children swimming.

Therefore, it is worth addressing this research problem, because this work can be used to broaden and deepen knowledge in this field.

The results obtained at the competition inform pupils, teachers and trainers to what extent the curricula have been implemented and can be an educational simulator. The comparison of the results speaks of the progression or regression of foster children in a discipline such as swimming. It should be noted that when analyzing one competition, the task boils down to selecting and developing the most diagnostic variables affecting the sports score as a function of time (Maszczyk 2013, p. 247). The analysis of the results obtained by pupils over the last 5 years indicates whether the development of the results achieved by pupils took place, and estimates predictive values for 2017. Compliance of result forecasts prepared at a young age is not high, considering the athletes' population, selection and selection of players should be a multi-stage and systematic process (Ryguła 2000, Mleczko et al. 2006, Mleczko 2008, Iskra and Coh 2011, Maszczyk et al. 2011, 2012). On model-built forecasts at the young age,

it projects many factors that can not be predicted at this stage of training (Maszczyk 2013, p.19). Linear and nonlinear models will be used in the work to check which one is less deviating from empirical data.

Purpose of research

The aim of the work was to analyze and compare sports results obtained by pupils during the Katowice Primary Schools in Swimming Championships for 5 years (2012-2016).

Methodology

The research was carried out in the school year 2011-2016 among primary school pupils from Katowice. They were repeated for 5 years using the same methods of physical fitness. Secondary data sets were examined. The study involved pupils from grades 3 and younger and from classes 6, girls and boys from Katowice schools. The age of the respondents was 8-10 (class III and younger) and 12-13 years (class VI). On the basis of internal tests, physical education teachers in Katowice primary schools chose the school's representation and applied for participation in the Katowice Primary School Swimming Championships. Tables with results from swimming competitions in 2012-2016 made available by the Inter-school sport center in Katowice were used. The document contained exact times with 25m freestyle and 50m freestyle girls and boys.

From the 3rd and the younger classes, the best times were 17 girls and boys, and from the 6th grade, after 12 best times from each year. The research was carried out on a 25-meter swimming pool at the Interschool Sports Center in Katowice. The competition took place in accordance with the provisions of PZP and FINA. Each competitor had the right to start in one individual competition and relay race. The Katowice Championships of Elementary Schools in swimming were run by the PZP judges and employees of the Interschool Sports Center. 145 girls and 145 boys from primary schools took part in the study. Descriptive statistics, including mean ± standard deviation (SD), Min-Max range, coefficient of variation, skewness and kurtosis, were calculated for the results of boys and girls in swimming at a distance of 25 meters and 50 meters in each audited year (2011-2016). The variable was examined for distribution normality by the Shapiro-Wilk test. The quality of the distribution was verified by the coefficient of variation. The shape of the data distribution was estimated with skewness and kurtosis. Differences between swimming results at a distance of 25 m and 50 m with respect to sex were created using the one-way analysis of variance (ANOVA). The homogeneity of variance was checked by the Levene test. The shape of the trend of changes in time and prediction were made using regression, determining linear and non-linear trends. The level of significance was set at 0.05 for all tests. The calculations were carried out with the statistic software package Statistica 12.5 (StatSoft, USA) and Excel spreadsheet 2013.

Results

At the beginning, the obtained variables were subjected to statistical processing aimed at their standardization, needed to perform some analyzes. The classic formula of standardization calculated using the formula: the difference between the value of the characteristic and the arithmetic mean divided by the standard deviation. Next, the distributions of the analyzed variables were checked for distribution normality by the Shapiro-Wilk test, which confirmed normality at the significance level of $p > 0.05$.

The homogeneity of variance was met at the level of $p > 0.05$. Next, the descriptive parameters of all analyzed variables obtained during swimming boys and girls were checked. They are presented in Tables 1-2. It was found that the results of position, variation and standard deviation measures show poorly differentiated distributions. Analyzes of the calculated variability coefficients (V) indicate that in the boys' group the greatest variation occurred in the years 2011/2012 at a distance of 25 m (18.82%),

as well as at a distance of 50 m (16.07%). In girls, observations indicated the greatest diversity in 2015/2016 on the distance of 25 m (20.78%) and 50 m (20.15%). Diversity at both studied distances was higher in girls than in boys. The best average times girls achieved in the year 2013/2014 at a distance of 25 m (20.85 ± 2.54 s) and 2014/2015 at a distance of 50 m (38.14

± 3.86 s). Boys, just like girls at a distance of 25 m, achieved the best times in 2013/2014 (20.03 ± 1.94 s), but at a distance of 50 m in 2012/2013 (37.52 ± 3.23 s).

Table 1. Descriptive parameters of the distribution of sports results of swimming in a style of any boys and girls for a distance of 25 m (s).

boys 25 m					
Years	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016
N	17	17	17	17	17
x̄(sd)	22,98 (4,32)	21,19 (2,14)	20,03 (1,94)	20,12 (1,69)	22,08 (2,84)
V	18,82	10,11	9,70	8,38	12,85
Min-Max	16,44-30,23	17,51-23,86	16,27-22,91	15,98-21,86	16,71-25,70
As	0,16	-0,31	-0,30	-1,53	-0,31
Ku	-1,24	-1,37	-0,63	1,68	-1,17
girls 25 m					
Years	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016
N	17	17	17	17	17
x̄(sd)	21,95 (2,32)	22,40 (2,78)	20,85 (2,54)	23,31 (4,66)	25,05 (5,21)
V	10,56	12,41	12,16	20,00	20,78
Min-Max	18,45-25,13	18,00-27,12	16,81-24,38	16,45-33,27	17,04-37,54
As	-0,15	0,34	-0,40	0,45	0,77
Ku	-1,67	-0,95	-1,34	-0,39	0,64

N - number, x ¯(sd) - standard deviation, V - coefficient of variation, Min -Max - range, Asceticism (asymmetry), Ku – kurtosis

Table 2. Descriptive parameters of the distribution of sports results of swimming in a style of any boys and girls for a distance of 50 m (s).

boys 50 m					
Years	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016
N	12	12	12	12	12
x̄(sd)	38,35 (6,16)	37,52 (3,23)	42,56 (6,35)	37,94 (3,96)	38,76 (5,30)
V	16,07	8,61	14,91	10,43	13,67
Min-Max	31,08-50,12	33,53-43,34	31,34-50,59	32,23-44,08	29,03-45,40
As	0,61	0,59	-0,25	0,15	-1,00
Ku	-0,59	-0,97	-0,99	-1,20	0,14
girls 50 m					
Years	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016
N	12	12	12	12	12
x̄(sd)	41,88 (6,60)	41,42 (4,30)	41,58 (4,51)	38,14 (3,86)	41,47 (8,36)
V	15,76	10,39	10,85	10,13	20,15
Min-Max	34,76-57,20	34,56-46,62	36,23-50,28	32,41-43,44	31,62-57,14
As	1,13	-0,55	0,77	0,19	0,73
Ku	1,25	-1,15	-0,46	-1,40	-0,85

N - number, x ¯(sd) - standard deviation, V - coefficient of variation, Min -Max - range, Asceticism (asymmetry), Ku – kurtosis

Tables 3 to 5 present the results of a one-way analysis of variance and regression linear and non-linear models for average boys' swimming results and girls at a distance of 25m / 50m in 2011-2016. Figures 1 to 2 show linear and nonlinear trends in relation to the average swim score of boys and girls over a distance of 25m / 50m.

The one-way analysis of variance for the values of boys and girls over a distance of 25 meters and 50 meters indicated that there were no intra-group differences (Table 3).

Table 3. Results of a one-way analysis of the variance of the results of sports freestyle swimming at a distance of 25 m (s) and 50 m (s) for boys and girls.

Distance	***Gender***	***Df***	***SS***	***MS***	***F***	***Relevance F***
25 meters	Girls	1	5,08	5,08	3,11	0,18
	Boys	1	0,82	0,82	0,44	0,56
50 meters	Girls	1	1,68	1,68	0,64	0,48
	Boys	1	0,15	0,15	0,03	0,88

Df - number of degrees of freedom, SS - sum of squares, MS - variance from the sample, F - distribution

To check the degree of matching of the trend function to the empirical data, the convergence coefficient φ^2 was calculated. The intersection points for the averaged values

in the 25 m freestyle swim were confirmed, which were: 20.57 (girls) and 22.13 (boys). At the distance of 50 meters, the intersection points for the averaged values were: 42.13 (girls) and 38.66 (boys).

It was found that regression functions of models for 25 m freestyle swimming were very well matched to empirical data, as only 29% of the variation of the sports score in the case

of girls was not explained by the trend function. However, as much as 87% of the variation in athletic performance in boys is not explained by the trend function, which indicates a poor matching, which was also found for freestyle swimming at 50 m. In the case of girls, 83% variation in athletic performance and 90% in boys, has been not explained by the trend function.

Verified regression models for swimming at 25 m (s) took the following form:

Boys 25m = x * 22,13-0,29

Girls 25m = 20.57 + 0.71 * x

Verified regression models for swimming at 50 m (s) took the following form:

Boys 50m = 38.66 + 0.12 * x

Girls 50m = x * 42,13-0,41

The confidence interval for the intersection points for averaged values at the confidence level of 0.95 indicates a fairly wide range (Table 4).

Tables 5 and 6, as well as figures 1 and 2 present the prediction for 2017 and a comparison with actual averaged swim scores of 25m and 50m girls and boys in 2011-2016. As can be seen in both cases, girls and boys, regression models predicted improvement in sports results in girls swimming at a distance of 50 m and boys at a distance of 25 m. Deterioration of sports results in swimming were observed, girls at 25 m and boys at 50 m. Returning to the verification of the models being built, it can be assumed that the forecast of girls' athletic performance at 25 m has high likelihood of realization compared to other starting models with poor matching to empirical data.

Table 4. Evaluation of parameters of regression models of the results of sports freestyle swimming at 25 m (s) and 50 m (s) boys and girls.

Distance	Gender	Coefficients	Standard error	t Stat	Value-p	Lower 95%	Higher 95%
25 m	Interection	20,57	1,34	15,36	0,00	16,31	24,84
	Girls	0,71	0,40	1,76	0,18	-0,57	2,00
	Interection	22,14	1,44	15,41	0,00	17,57	26,71
	Boys	-0,29	0,43	-0,66	0,56	-1,67	1,09
50 m	Interection	42,13	1,71	24,68	0,00	36,70	47,56
	Girls	-0,41	0,51	-0,80	0,48	-2,05	1,23
	Interection	38,66	2,45	15,79	0,00	30,87	46,45
	Boys	0,12	0,74	0,17	0,88	-2,22	2,47

Table 5. Predicted sports results of free-style swimming at 25 m (s) for boys and girls, determined by regressive linear and non-linear models.

Years	Boys			Girls		
	Coefficient of determination = 0,13 Coefficient of convergence = 0,87 Multiple R = 0,36			Coefficient of determination = 0,71 Coefficient of convergence = 0,29 Multiple R = 0,51		
	mean	linear model	non-linear model	mean	linear model	non-linear model
2011/2012	22,98	21,85	21,82	21,95	21,29	21,33
2012/2013	21,19	21,57	21,53	22,40	22,00	21,99
2013/2014	20,03	21,28	21,25	20,85	22,71	22,67
2014/2015	20,12	20,99	20,97	23,31	23,42	23,37
2015/2016	22,08	20,71	20,70	25,05	24,14	24,09
Forecast 2016/2017		20,42	20,43		24,85	24,84

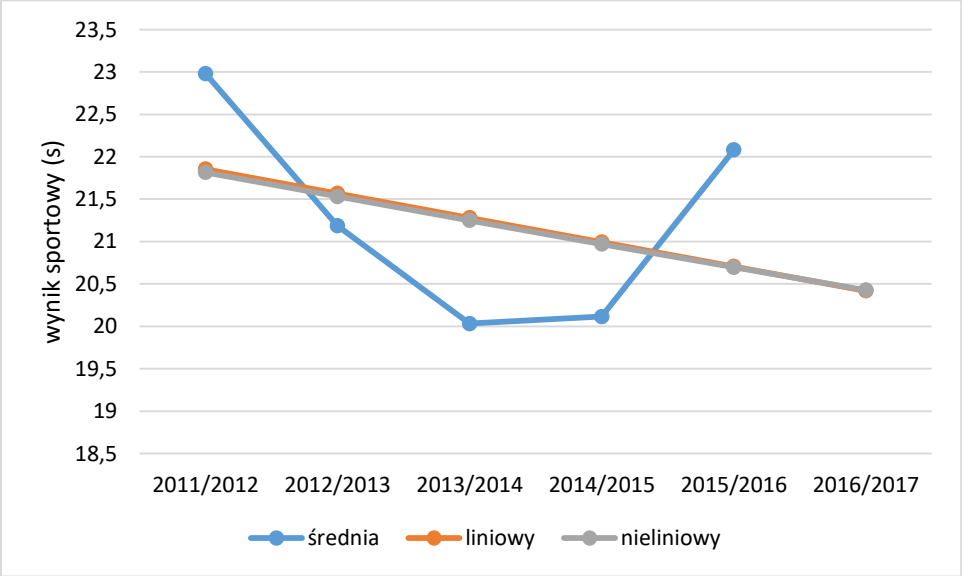

Figure 1. Empirical data on the development of sports results of free style swimming at 25m (s) boys with linear and non-linear trends in 2011-2016 and the forecast for 2017.

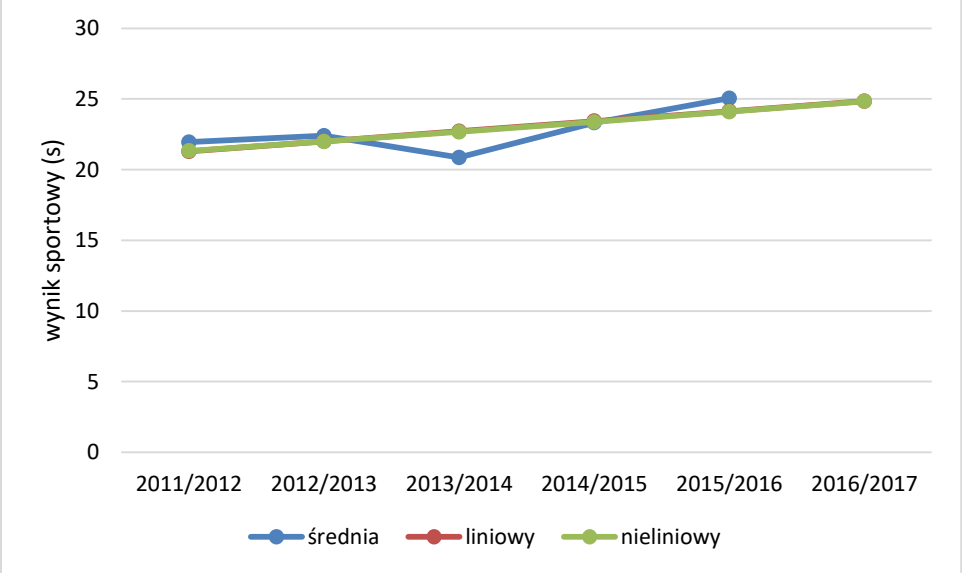

Figure 2. Empirical data on the development of the results of sports freestyle swimming at 25m (s) of girls with linear and non-linear trends in 2011-2016 and the forecast for 2017.

Table 6. Predicted sport results of freestyle swimming at 50 m (s) for boys and girls, determined by regressive linear and non-linear models.

Years	Boys			Girls		
	Coefficient of determination = 0,10 Coefficient of convergence = 0,90 Multiple R = 0,10			Coefficient of determination = 0,17 Coefficient of convergence = 0,83 Multiple R = 0,42		
	mean	linear model	non-linear model	mean	linear model	non-linear model
2011/2012	38,35	38,78	38,74	41,88	41,72	41,72
2012/2013	37,52	38,90	38,86	41,42	41,31	41,30
2013/2014	42,56	39,03	38,99	41,58	40,90	40,88
2014/2015	37,94	39,15	39,11	38,14	40,49	40,46
2015/2016	38,76	39,28	39,24	41,47	40,08	40,05
Forecast 2016/2017		39,40	39,37		39,67	39,64

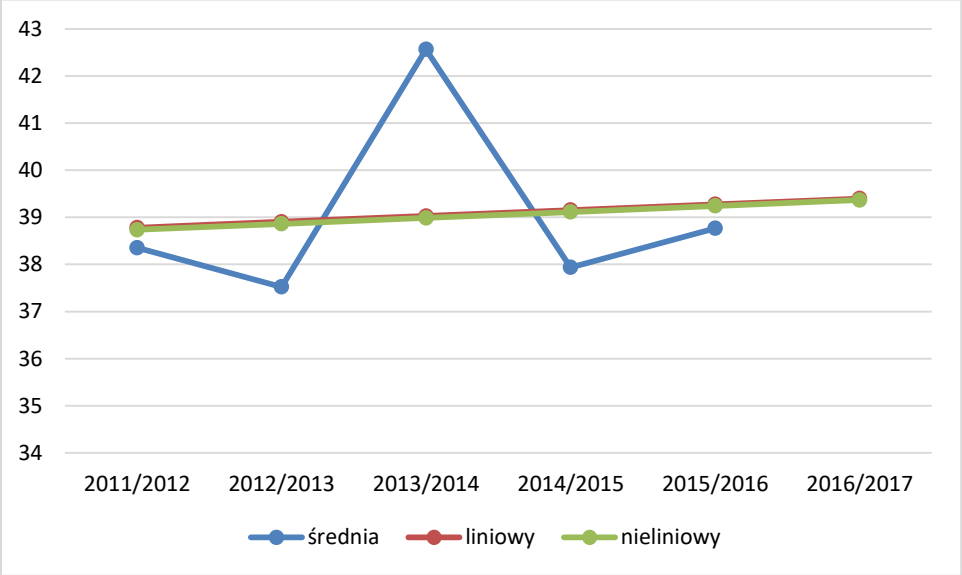

Figure 3. Empirical data on the development of sports results of free style swimming at 50m (s) boys with linear and non-linear trends in 2011-2016 and the forecast for 2017.

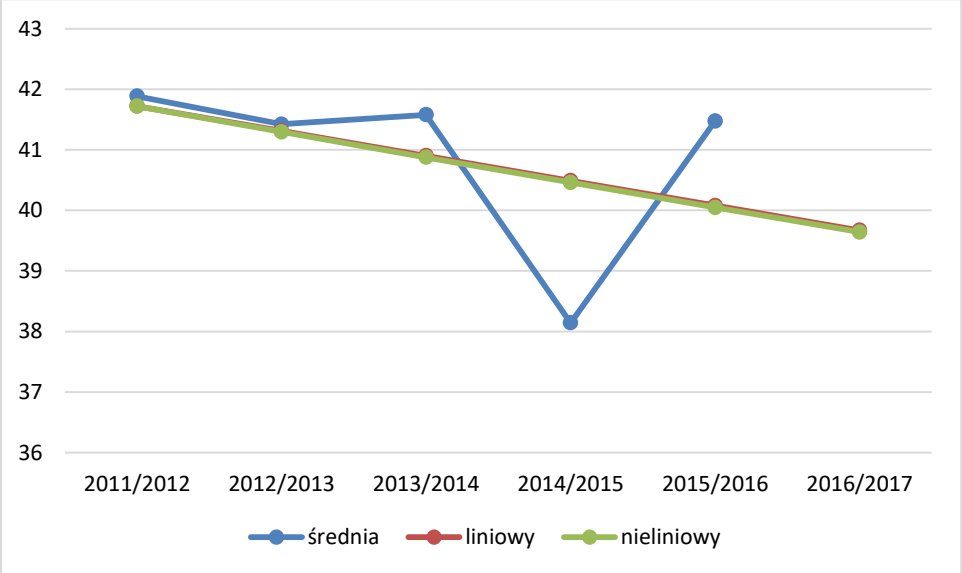

Figure 4. Empirical data on the development of sports results of free style swimming at 50m (s) of girls with linear and non-linear trends in 2011-2016 and the forecast for 2017.

Discussion

The aim of the work was to evaluate the sports results in swimming competition achieved by pupils during the Katowice Primary School Championships in 2012-2016. The obtained results helped to determine the development of trend and forecasts in swimming for pupils of Katowice schools. This work informed about the progress and regress of competing pupils and could contribute to the development of training methods. However, the research took place on a small population and lasted only during 5 years. Is it possible to predict the pupil outcomes for swimming in 2017? Regression models predicted improvement in sports results in girls swimming at a distance of 50 m and boys over a distance of 25 m. Deterioration of sports results in swimming was observed for girls at 25 m and boys at 50 m. It can be assumed that the forecast of girls' athletic performance at 25 m has high probability of realization, compared to other starting models with poor matching to empirical data.

Relevance of forecasts depends almost entirely on the research material and specified variables and on the algorithm used. The selection of appropriate variables is important due to the necessary model-learning processes and testing it in subsequent epochs of creation (Maszczyk 2013, p.248).

As it is shown, one cannot clearly determine which methods should be used for analysis in a research. However, it should be remembered that conducting forecasts is very useful in the work of a physical education teacher, instructor and of course every trainer.

Conclusions

1. In the group of boys, the highest variation occurred in 2011/2012 at a distance of 25 m (18.82%), as well as at a distance of 50 m (16.07%).
2. In the group of girls the greatest variation occurred in the years 2015/2016 on the distance of 25 m (20.78%) and 50 m (20.15%).
3. Differences in the two studied distances were higher in girls than in boys.
4. The best average times girls achieved in the years 2013/2014 on a distance of 25 m (20.85 ± 2.54 s) and in 2014/2015 on a distance of 50 m (38.14 ± 3.86 s).
5. The boys at the distance of 25 m achieved the best average times in 2013/2014 (20.03 ± 1.94 s) and at the distance of 50 m in 2012/2013 (37.52 ± 3.23 s).

References

1. Karpiński, R. (2002). Swimming: Basic of technique, teaching. Katowice: AWF Katowice. [in Polish]
2. Maszczyk, A. (2013). Analysis and prediction of the dynamics of the volatility world's results athletics competition in the years 1946-2011. Katowice: AWF Katowice. [in Polish]
3. Raczek, J., Mynarski, W., Ljach, W. (2003). Shaping and diagnosis of coordination motor abilities. Handbook for teachers, trainers and students. Katowice: AWF Katowice.[in Polish]
4. Stachura, A., Płatek, Ł. (2012). Swimming in a primary school. Katowice: AWF Katowice. [in Polish]
5. Strzyżewski, S. (1996). Process of Teaching and Education in Physical Culture. Warsaw: WSiP. [in Polish]