Level of Creativity of Students in Study and Vocational Programmes at a Secondary School

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Abstract

This study addresses the level of creativity among students in secondary vocational education and training programmes. The topic remains highly relevant and is increasingly being incorporated into the educational process by teachers. The research focuses on students' creativity across various fields within these programmes, analysing differences and patterns in their creative abilities. Overall, the study examines the issue of creativity in adolescents within the context of vocational education.

Keywords: Verbal Creativity Study, Figurative Creativity, Study Program, Vocational Programme

1 Introduction

1.1 Research Topic

An effective teacher seeks strategies to facilitate students' long-term and efficient retention of knowledge. Accordingly, a variety of methods are employed to support the learning of subject matter. Teaching methods constitute a crucial component of the educational process, as they enable the effective transmission of relevant content to students. In the contemporary educational context, it is necessary to employ not only traditional methods, such as lectures and explanations, but also non-traditional approaches that encourage independent learning and problem-solving. These methods additionally foster the development of logical, analytical, and creative thinking skills. Zelina (1996) cites one of the foremost experts in the

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field of creativity, E. P. Torrance, who asserts that the development of students' creativity depends fundamentally on the presence of creative teachers.
This results from the conditions of the educational process and it is desirable to focus, concentrate attention on the development of the creative personality not only of the learner (educator), but to the same extent also of the teacher (educator), because progress in the education and training of students depends to a large extent and essentially, primarily, on the teacher's approach to teaching. At secondary vocational schools, students' education is primarily based on vocational subjects. This study examines the level of creativity among students in secondary vocational education and training programmes. The topic remains highly relevant and is increasingly being incorporated into the teaching process by educators. The research focuses on students' creativity across various fields within these programmes, comparing different areas of study. Overall, the study analyses the issue of creativity in adolescents within the context of vocational education. It focuses on comparing the achieved results of creativity in terms of variables, namely independent variables such as gender and the type of school the students attend. The dependent variables are creativity and its components – fluency, flexibility, originality and elaboration. This research can help to create a picture of the creativity of students in secondary vocational schools and compare the results.

1.2 Research Objectives

The main objective of the research is to determine whether there are differences in verbal and figurative creativity among secondary vocational school students in terms of major. The second objective is to determine whether there are differences between students in terms of gender.

1.3 Hypotheses

H1: We assume that there are statistically significant differences in verbal creativity among secondary vocational school students in terms of major.
H2: We assume that there are statistically significant differences in figurative creativity among secondary vocational school students in terms of major.
H3: We assume that there are statistically significant differences in verbal creativity among secondary vocational school students in terms of gender.
H4: We assume that there are statistically significant differences in figurative creativity among secondary vocational school students in terms of gender.

1.4 Method

To determine the level of figurative creativity of secondary vocational school students with the subsequent possibility of adequate interpretation of the obtained data, the standardised Torrance Figural Test of Creative Thinking – Circles (Jurčová, 1984) was used in the research.

The analytical intelligence test – the Sentence subtest was used to determine the level of verbal creativity (Svoboda, 1999). The test was accompanied by a questionnaire in which students were to fill in their gender, age and field of study.

1.5 Description of the Research Sample

The research is conceptualised as quantitative. It is carried out on a sample of 271 students of the study and vocational programmes attending the Secondary Vocational School of Business and Services in Nové Mesto nad Váhom. Study programme with a study duration of 4 and 5 years, hotel school – in this field, it is also possible to study in the dual education system. Study programmes with a study duration of 4 years – tourism services, business school, and salesperson. Vocational programmes with a study duration of 3 years, cook, hairdresser, joiner, car repairman – mechanic, car repairman – electrician. Postgraduate study with a study duration of 2 years – entrepreneurship in crafts and services. The research sample consisted of a total of 271 students in the study and vocational programmes. In the study programme, there were 47 men and 133 women (17.34% men and 49.08% women), and in the vocational programme, there were 59 men and 32 women (21.77 men and 11.81 women).
The average age of students in both fields was 17.4 years, of which 17.5 years for students of the study programme and 17 years for students of the vocational programme. The overall distribution of scores is in Table 2.

Complete/incomplete secondary school studies	Study programme		Vocational programme		Together
Gender	Men	Women	Men	Women	
Absolute abundance	47	133	59	32	271
Relative abundance	17,34	49,08	21,77	11,81	100

Table 1: Frequency distribution of the sample by field.

Age	15-16	17	18	19	20 and more	Together
Absolute number	76	67	62	47	19	271
Relative number	28,04	24,72	22,87	17,34	7,01	100

Table 2: Distribution of students by age category.

1.6 Instrument Used

To measure figurative creativity, the Torrance Figural Test of Creative Thinking (T-59) was used, which was standardised for our conditions by Marta Jurčová in 1984. In this test, a test with circles was used, where the test subjects had to draw 36 circles in any way so that they could create pictures. They could draw into the circles, between them, connect them, etc. Originality, fluency and flexibility of answers are assessed. Jurčová (1984) allows for the evaluation of elaboration in this task, but in this case, standard norms were followed, and this component of creativity was not assessed.
To measure verbal creativity, an analytical intelligence test was used, the sentence subtest, where the author is R. Meili. The test was developed in 1928 for the purposes of school and career counselling. The task of the respondents in the sentence subtest will be to create as many meaningful sentences as possible within a time limit of two minutes, with each sentence containing all the words selected for them. The words entered can be inflected and used in the plural and must be used as nouns. They cannot be used as verbs or adjectives. The sentences must be meaningful and express an idea.

1.7 Data Analysis

Data Collection
The research is conducted during the 2024/2025 school year at the Secondary Vocational School of Business and Services in Nové Mesto nad Váhom, during the classroom teaching. Respondents are informed in advance about the anonymity of the testing, and its content is explained to them. Examples are given to them so that the testing has the highest possible validity.

Data processing
Both creativity tests are evaluated according to the manuals. The Excel programme with the real-statistics statistical add-on is used for statistical data processing. We work with data such as the field of study, gender, level of verbal creativity and level of figurative creativity as variables. As part of the descriptive analysis of the research sample, we use descriptive statistics (absolute and relative frequency, standard deviation, arithmetic means, medians). We carry out verification of quantitative hypotheses.

2 Results – Statistical Evaluation of Verbal Creativity Results

We are interested in whether there would be significant differences between students of the vocational programmes and the study programmes in verbal creativity, where we use the

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Sentence subtest. Representation of the frequency of individual respondents is divided into levels (below average, average and above average creativity).

H1: We assume that there are statistically significant differences in the mean value of verbal creativity between students at secondary vocational schools in terms of study field.

Verbal creativity	Below-average level of creativity	Average level of creativity	Above-average level of creativity	Together
Study programme	50	34	7	91
Vocational programme	37	104	39	180
TOTAL %	32.1%	50.9%	17.0%	100%

Table 3: Distribution of students according to their level of verbal creativity in terms of subject.

Representation of the frequency of individual students according to the level (below average, average, above average creativity) of verbal creativity, which is formed by the vocational and study programmes. We see that in both groups of students; it falls into the average range of verbal creativity (50.9%).

α=0.05	Average	Median	Modus	Standard deviation	Dispersion	D'Agostino-Pearson	F-test	T-test
Verbal creativity of study programmes	12.511	12	12	4.803	23.0669	0.1057	0.6581	0.0000
Verbal creativity of vocational programmes	8.286	8	4	4.603	21.1841	0.0731		

Table 4: Statistical differences in verbal creativity by field of study

The values of descriptive statistics are in the table – mean, median, mode, standard deviation and variance. We decided to use the d'Agostino-Pearson test to verify normality in the comparison. We could also use the Shapiro-Wilkow test, which, however, is extremely sensitive to even small deviations from normality in larger samples over 50, which can lead to rejection of the hypothesis of a normal distribution. d'Agostino–Pearson is more robust in larger samples because it combines tests for skewness and kurtosis. Since the value of the d'Agostino-Pearson test of normality is greater than the chosen significance level α=0.05 in both samples, the distribution can be considered normal. The course can be seen in the rank-sum graphs.

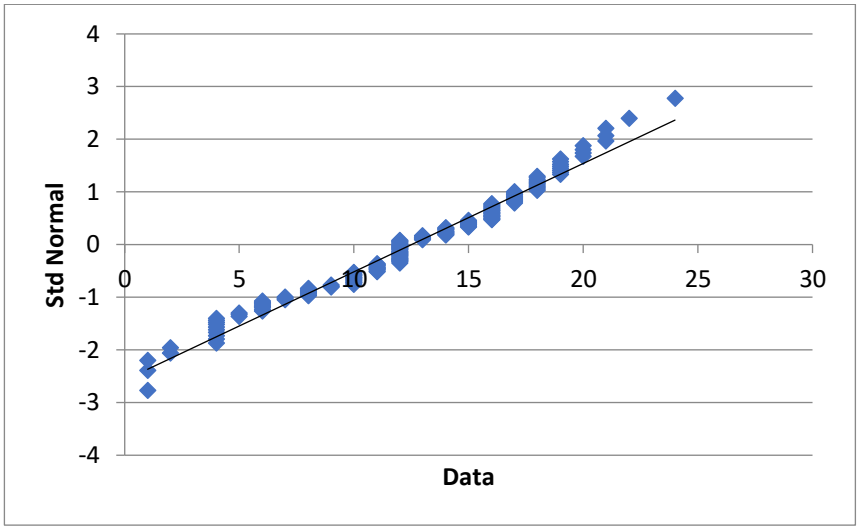


Chart 1: Rankite chart verbal creativity of study programmes.

The core of the data is fairly normal. The lower tail on the left contains values that are below the line, meaning more extremely low values. The upper tail on the right contains values that are above the line, but less significantly than the lower tail.

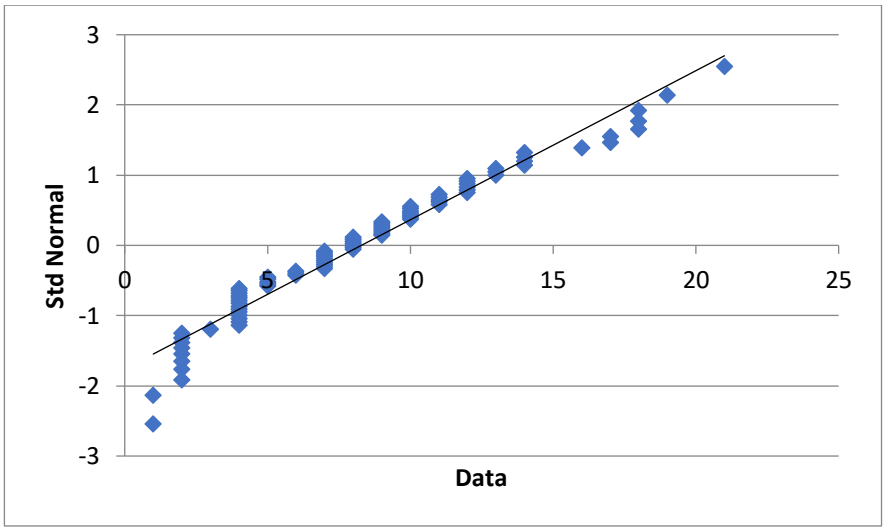


Chart 2: Rankite chart verbal creativity of vocational programmes.

The data deviate more from normality, especially in the lower tail, which can also be seen in the smaller p-value of the d'Agostino-Pearson test. However, this is not a problem because the t-test is very robust to possible deviations from normality, especially if the variance ratio is less than 2. In our case, it is only 1.08, which can be calculated from the variance values given in the table.

Since the t-test for independent samples has two alternatives, with equality or inequality of variances, we also tested the difference in variances. Since the p-value of the F-test is greater than the selected significance level $\alpha=0.05$, we consider the variances to be equal.

Since the probability value of the t-test is less than the significance level p (0.0000) < α (0.05), we conclude that there is a statistically significant difference in average verbal creativity between the study and vocational programmes. The study programmes achieved a significantly higher average score.

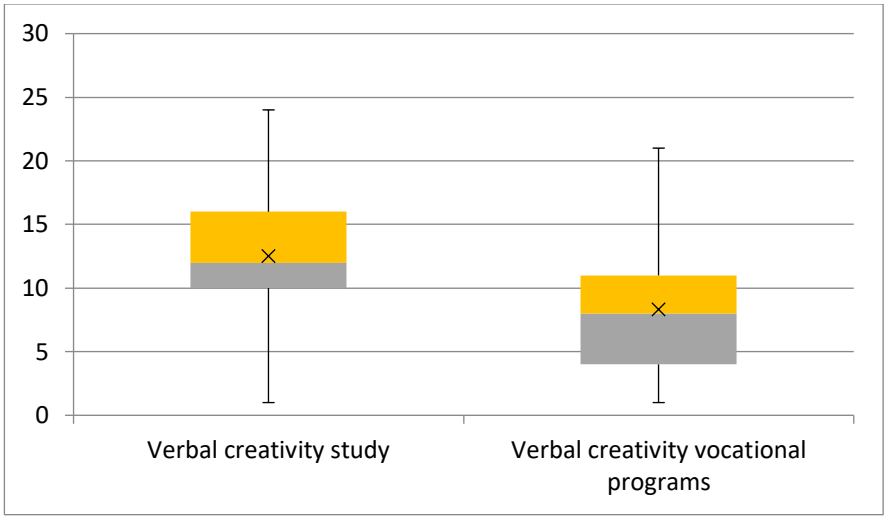


Chart 3 Box plot verbal creativity study and vocational programmes

The lines represent the minimum and maximum values. The crosses represent the averages. The coloured boundaries of the boxes represent the medians. The bottoms of the boxes are the lower quartiles, and the tops of the boxes are the upper quartiles. It can be seen that the study programmes achieved higher scores and the result is statistically significant. Hypothesis *H1 was confirmed.*

H2: We assume that there are statistically significant differences in the mean value of figurative creativity among secondary vocational school students in terms of field.

α=0.05	Average	Bedian	Modus	Standard deviation	Dispersion	D'Agostino-Pearson	F-test	T-test
Figural creativity of study programmes	31.28	31	30	13.524	182.892	0.7975	0.0080	0.0003
Figural creativity of vocational programmes	25.879	25	24	10.506	110.374	0.2774		

Table 5: Statistical differences in figurative creativity in terms of field.

Normality is in order because the p-values of the d'Agostino-Pearson test are greater than the significance level α=0.05. Evidence is also seen in the rank-sum plots, where the points almost perfectly follow the line of the standardised normal distribution.

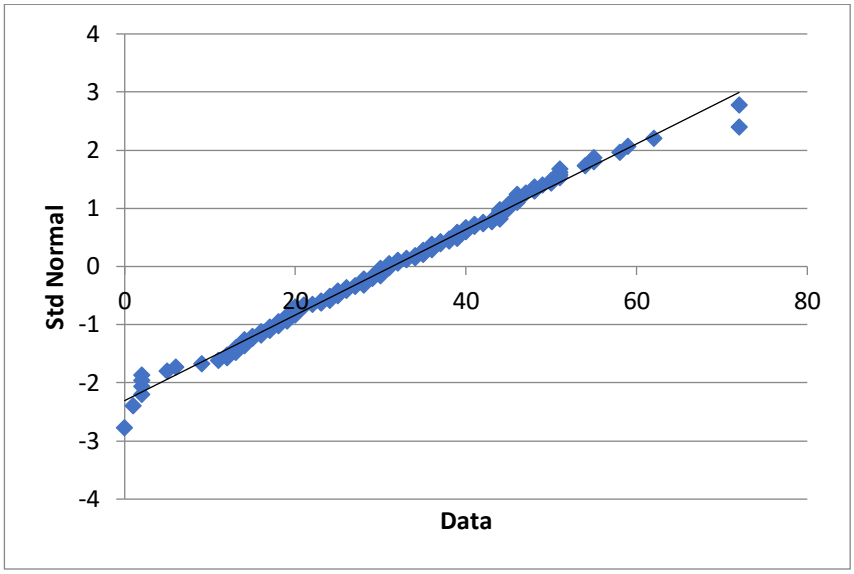
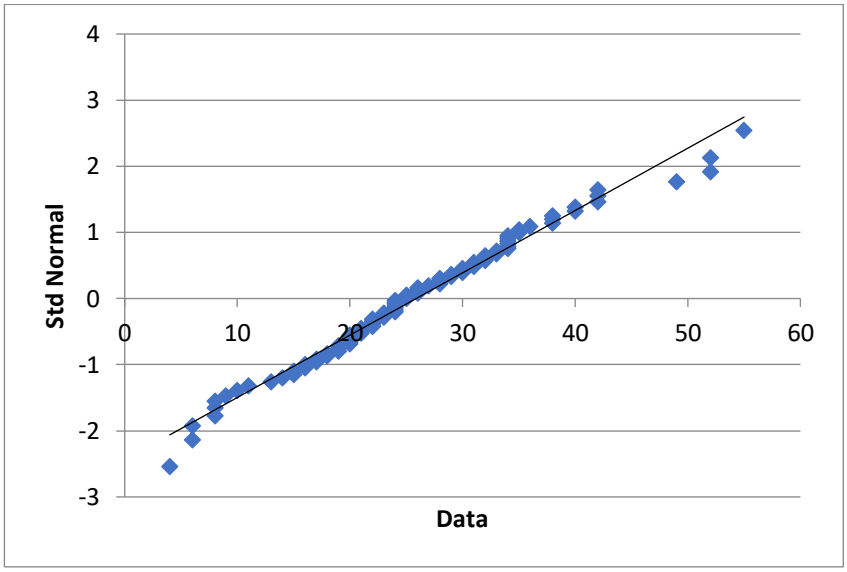
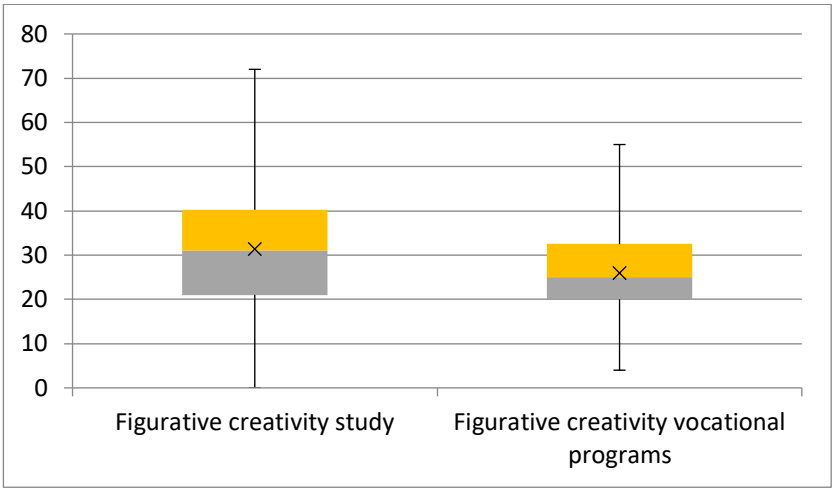


Chart :4 Rankite chart figurative creativity of study programmes.



Graph 5: Rankite graph figurative creativity of vocational programmes.

Since the F-test value for the variance is less than the significance level α=0.05, the variances are statistically significantly different. Therefore, we used a t-test with inequality of variances for verification. Since the probability value of the t-test for the two-sided alternative hypothesis is less than the significance level p (0.0003) < α (0.05), we conclude that there is a statistically significant difference between the selections of study and vocational programmes. Study programmes achieved, on average, a statistically significantly higher average figurative creativity.



Graph 6: Box plot figurative creativity study and vocational programmes.

The lines represent minimum and maximum values. The crosses represent averages. The coloured boundaries of the boxes represent medians. The bottoms of the boxes are the lower quartiles, and the tops of the boxes are the upper quartiles. It can be seen that the study programmes achieved higher scores and the result is statistically significant. *Hypothesis H2 was confirmed.*

H3: We assume that there are statistically significant differences in verbal creativity between secondary vocational school students in terms of gender.

Verbal creativity	Below-average level of creativity	Average level of creativity	Above-average level of creativity	Together
Women	18.2%	60.0%	21.8%	100%
Men	53.7%	36.8%	9.5%	100%

Table 6: Frequency distribution of students according to their level of verbal creativity in terms of gender.

Representation of the frequency of individual students according to the level (below average, average, above average creativity) of verbal creativity, which is formed by men and women. We can see that women have a significantly higher average level of verbal creativity (60%), compared to men, who had an average level of verbal creativity of 36.8%. The table shows that up to 53.3% of men had a below-average level of creativity, while for women it was only 18.2%.

α=0.05	Average	Median	Modus	Standard deviation	Dispersion	D'Agostino-Pearson	Mann-Whitney Test
Verbal creativity in men	8.566	8	4	5.118	26.1908	0.0166	0.0000
Verbal creativity in women	12.715	12	12	4.454	19.8391	0.4929	

Table 7: Statistical differences in verbal creativity by gender.

This d'Agostino-Pearson test indicates a violation of normality in men; we used the nonparametric Mann-Whitney test for two independent samples for comparison.

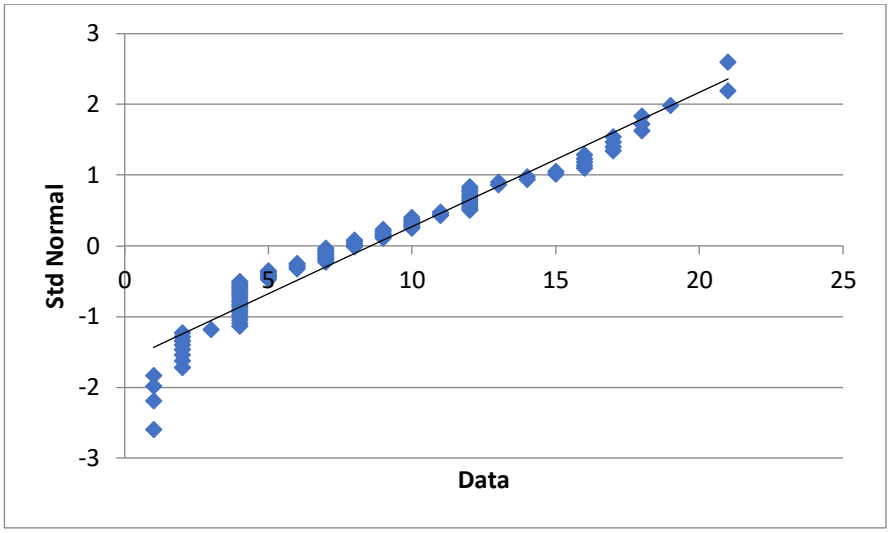
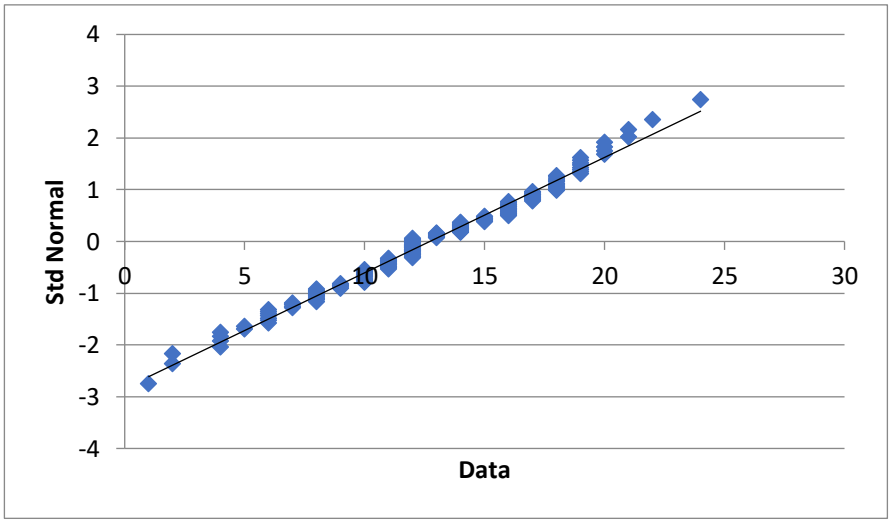


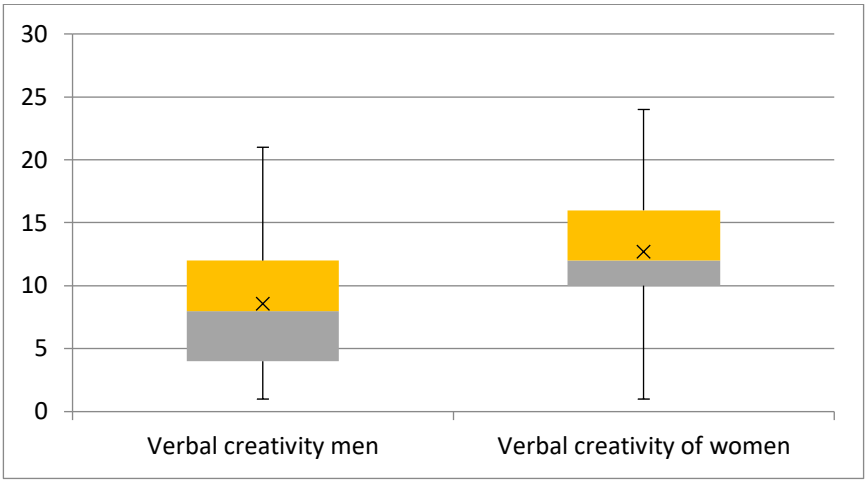
Chart 7: Rankite chart of male verbal creativity.

In the rank-sum graph for men, significant deviations can be seen, especially in the lower tail, and an s-shaped data curve, which indicates deviations from normality. Whereas women are normally distributed, and the values almost ideally follow the straight line of the standardised normal distribution.



Graph 8 Rankite graph of female verbal creativity

Since the probability value for the two-sided alternative hypothesis is less than the significance level p (0.0000) < α (0.05), we conclude that there is a statistically significant difference in medians between the selections.



Graph 9: Box plot of verbal creativity in men and women.

The box plot shows that verbal creativity in women is statistically significantly higher. Hypothesis *H3 was confirmed.*

H4: We assume that there are statistically significant differences in figurative creativity between secondary vocational school students in terms of gender.

α=0.05	Average	Median	Modus	Standard deviation	Dispersion	D'Agostino-Pearson	F-test	t-test
Figural creativity in men	24.509	24	30	12.730	162.043	0.2079	0.5130	0.0000
Figural creativity in women	32.849	32	44	12.023	144.559	0.1159		

Table 8: Statistical differences in figurative creativity by gender.

This d'Agostino-Pearson test indicates that normality is in order.

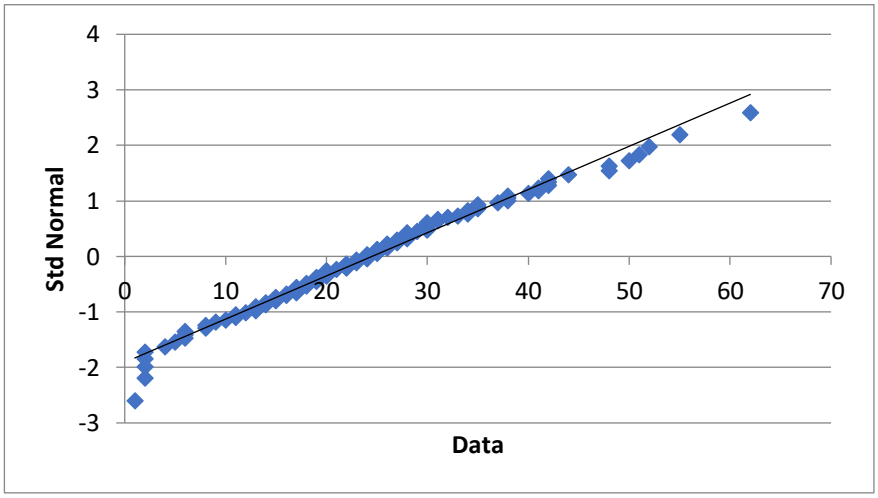


Chart 10: Rankite chart of male figurative creativity.

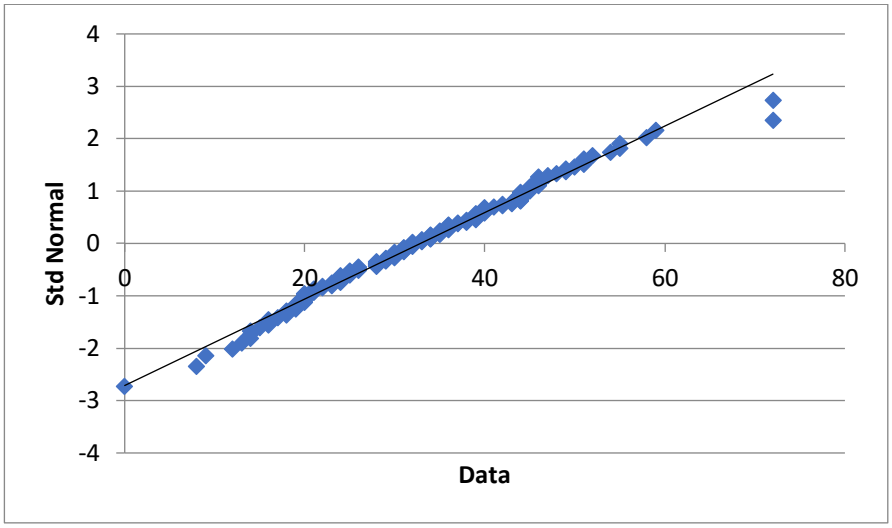


Chart 11: Rankite chart of female figurative creativity.

According to the F-test, we see that the variances are not statistically significantly different. Therefore, we used a t-test with equal variances for comparison. Since the probability value of the t-test for the two-sided alternative hypothesis is less than the significance level p (0.0000) <α (0.05), we conclude that there is a statistically significant difference between the selections. Women achieved a statistically significantly higher average figurative creativity on average.

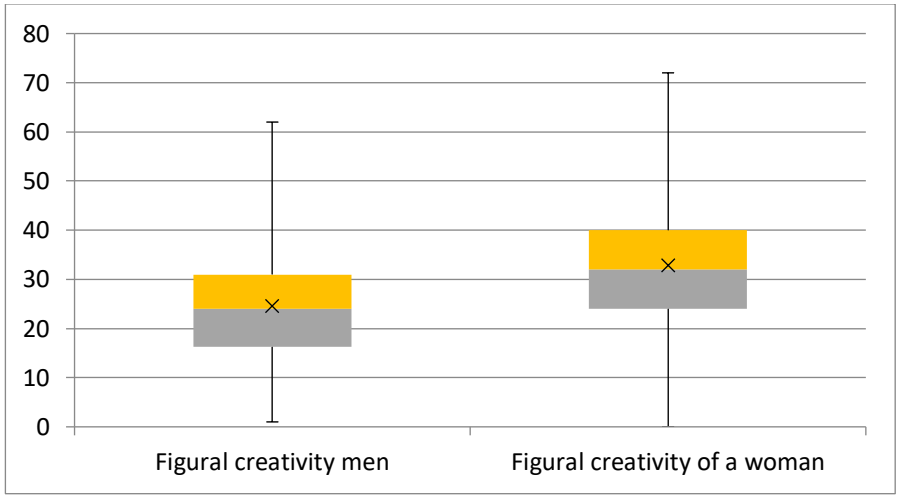


Chart 12: Box plot of figurative creativity in men and women.

From the box plot, we can see that there are significant gender differences in figurative creativity, where women achieved higher figurative creativity. *Hypothesis H4 was confirmed.*

3 Conclusion

The research results indicated that students enrolled in the study programme demonstrated a higher level of verbal creativity than those in the vocational programme. This difference may be attributed to the greater complexity of the curriculum, higher demands on abstract thinking, and more frequent opportunities for developing language and communication skills within study programmes. These findings suggest that the type of educational field can exert a significant influence on the development of creative thinking, particularly in the domain of verbal expression. The findings also emphasise the need to support creativity in vocational programmes – for example, by introducing activities oriented towards the development of language competencies, working with text and creative problem solving.

The development of creativity should be part of all educational fields, as it represents an important competence for the professional and personal growth of students. In verbal creativity, women achieved a higher level compared to men. This difference was particularly evident in the areas of originality, fluency, and flexibility of word associations. The findings suggest that women may be more effective in using language skills in verbal creative tasks, which may be related to a combination of biological, social, and cultural factors. Although gender differences are not absolute and there is considerable individual variability, the results support the need for further research into how different factors influence creative processes. In conclusion, understanding these differences can inform the design of educational and development programmes that better align with individual strengths and promote the cultivation of creativity across the student population.

Our research confirmed that students in study programmes demonstrated a higher level of figurative creativity compared with those in vocational programmes. This difference may be attributed to greater demands on abstract thinking, more complex curricular content, and the more frequent application of creative processes within study programmes. The findings indicate that the type of educational field can significantly influence the development of students' creative abilities.

The research also underlines the need for systematic support for creativity in vocational programmes, especially through activating methods, project-based teaching and opportunities for practical creative activity. Strengthening these elements could contribute to balancing the differences between individual types of fields and to the overall development of students' creative potential. In the area of figurative creativity, it turned out that women achieved higher scores than men. This difference suggests that women may exhibit greater flexibility, originality, or attention to detail when solving visual-creative tasks.

Although these findings are specific to the research sample, they highlight the need for further investigation into gender differences in creativity, particularly with regard to social, cultural, and educational factors that may influence such differences. The results also underscore the importance of fostering the development of creative abilities in both sexes, considering their unique characteristics and individual needs.

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