

## GRAPHOMOTORICAL SKILLS AND VERBAL FLUENCY IN STUDENTS OF HIGHER EDUCATION

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### Abstract

Graphomotorical skills and verbal fluency of 135 students of Faculty of Education in Pristina were researched. In this research, students of the third year of studies, respectively 71 students who attend preschool education program and 64 students of English language and literature were included. In order to assess the graphomotorical skills the following tests were applied: test of writing Albanian letters, while for the assessment of verbal fluency, the test of writing words starting with letter “p” and the test of writing words starting with letter “s” were used. Initially, frequencies and percentages of results of the tested students were analyzed, then basic statistical parameters: arithmetic mean ( $\bar{x}$ ), standard deviation ( $\sigma$ ), the standard deviation of arithmetic mean ( $\bar{x}\sigma$ ), as well as minimum scores (Min) and maximum scores (Max) were calculated for all applied variables in this research. Differences between students of both programs were obtained through the analysis of canonical discrimination and t-test. In addition, through Pearson correlation coefficient, the connection between the variables of verbal fluency was assessed for the tested group of students. Statistical data obtained through the analysis of canonical discrimination show that there are significant statistical differences between tested students of the two programs. Results of the t-test prove that there are no differences among the tested groups of students in the variables of the test of writing Albanian letters, while there are significant differences in the variables of the test of writing words that start with letter “p” and the test of writing words that start with letter “s” in favor of students of English language and literature, indicating that, in general, their preference is more towards language compared to the students studying preschool education. The data obtained from this research also show that the degree of correlation between the applied variables assessing verbal fluency is high for both groups of tested students. It is recommended to continue with further research in the area of graphomotorical skills and verbal fluency in order to increase attentive selection of students according to their abilities for the relevant programs of higher education.

**Keywords:** *graphomotorical skills, verbal fluency, higher education.*

### Introduction

According to Coulmas (2003), *writing* is the single most consequential technology ever invented. At least six meanings of “writing” can be distinguished:

1. a system of recording language by means of visible or tactile marks;
2. the activity of putting such a system to use;
3. the result of such activity, a text;
4. the particular form of such a result, a script style such as block letter writing;
5. artistic composition;
6. a professional occupation (p. 1).

*Alphabet*: a system of signs expressing the basic sounds of a language. Unlike scripts of pictographic origin such as cuneiform or hieroglyphic scripts based on a large number of stylized symbols, an alphabet reproduces at least consonant sounds via a small number of simplified symbols. After a long process of evolution, the Phoenician alphabet of 22 letters took shape around 1100 B.C., and later spread to many cities on the Mediterranean rim. Around the 8th century B.C., it was adopted by Greeks, who added letters for the vowels, thus making the world's first complete alphabet (Andre-Salvini, 1995, p. 11).

*Speed of processing* basically refers to the maximum speed at which a given mental act may be efficiently executed. Speed of processing indicates the time needed by the system to record and give meaning to information. Traditionally, the faster an individual can recognize a stimulus, the more efficient his processing is considered to be (Demetriou et al., 2002, p. 6). Turner (1999, p. 189), states that tasks of fluency tap the ability to generate multiple responses spontaneously following a single cue or instruction.

According to Chenoweth et al. (2001), *writing fluency* can be defined as the “rate of production of text” (p. 81). Linked to this, Wolfe-Quintero et al. (1998) pointed that “writers that produce a greater number of words/signs in a specific amount of time are considered to be more fluent than those who produce a smaller number” (p. 4). Ward (2006) stressed that “fluency also shows the extent to which *graphomotorical execution* is automatized and does not require any awareness, or at least not a relevant amount” (p. 285).

*Verbal fluency* can be described as the ability to generate novel verbal responses. Two types of verbal fluency can be distinguished: phonemic and semantic fluency. In *phonemic* fluency tasks, words have to be generated starting with a certain letter. In *semantic* fluency tasks, words have to be generated based on a semantic category, for example “animals” (Spek et al., 2008, p. 652). In phonological verbal fluency tests a single letter is provided and the volunteer has to generate as many words starting with the specified letter as he/she can within a specified period of time (Abreu with associate, 2013, p. 63).

*Clinical and neuroimaging data* suggest that phonemic and semantic fluency rely on distinct cognitive resources. These clinical findings are in line with numerous functional magnetic resonance imaging studies, demonstrating that phonemic verbal fluency was associated with extensive activation in the left frontal cortex, whereas semantic verbal fluency was associated with the activation of the temporal or retrosplenial areas of the left hemisphere (Weiss et al., 2006, p. 503).

According to Panaoura, (2007, p. 35) there is evidence that *processing speed* changes uniformly with age, in an exponential fashion, across a wide variety of different types of information and task complexities. That is, change on speed of processing is fast at the beginning (i.e., from early to middle childhood) and it decelerates systematically (from early adolescence onwards) until it attains its maximum in early adulthood.

As long as *educators* see intelligence as something essentially fixed which predetermines their students’ ability to process all kinds of data they would be quite right to treat it with great suspicion, as a lurking force which undermines all of their efforts. But as soon as one accepts the fact that the functioning of the general intellectual processor in the mind can be improved by education, then the construct of intelligence becomes more acceptable than in the past. It no longer has ultimate control over our students’ ability to learn, and the tables are turned so that educators now have it in their power to raise their

students' general cognitive ability, and so raise all of their academic performance (Adey at al., 2007, p. 92).

To help all students to learn in and for this changing environment, academics as *university teachers* need a better understanding of teaching and learning issues as well as to advance their pedagogic competences. Many current methods, such as widespread lecturing to students, relegate students to passivity, tend to focus narrowly on subject knowledge, and, thus, are inadequate. Instead, effective teaching needs to put student learning at the center of the teaching process (Pleschová at al., 2012, p. 5).

## **Purpose of research**

Purpose of this research is the assessing graphomotorical skills and verbal fluency in students of higher education.

## **Tested students and methods**

### *Sample of the tested students*

This research consists of a sample of 135 students of the Faculty of Education in Pristina. In this research, students of the third year of studies, respectively 71 students who attend preschool education program and 64 students of English language and literature were included.

### *Sample of variables*

Sample of variables consists of the variable of students according to programs, the variable of the test of writing Albanian letters (TAL), the variable of the test of writing words starting with letter "p" (TWP), as well as, the variable of the test of writing words starting with letter "s" (TWS).

In order to assess the graphomotorical skills the following tests were applied: the test of writing Albanian letters, while for the assessment of verbal fluency, the test of writing words starting with letter "p" and the test of writing words starting with letter "s" were used.

During the testing with the test of writing Albanian letters, students were instructed to write as many letters of the Albanian language during one minute in their best handwriting. While for test of writing words that start with letter "p" and test of writing words that start with letter "s", they were given two minutes time to finish each test in their best handwriting, too. During the evaluation, only correctly written letters and words were taken into account.

## **Statistical analysis of results**

For the purpose of reaching the aims of this research, initially, frequencies and percentages of results of the tested students were analyzed, then basic statistical parameters, respectively the arithmetical mean ( $\bar{x}$ ), standard deviation ( $\sigma$ ), standard error of arithmetical mean ( $\sigma\bar{x}$ ), as well as minimal results (Min) and maximal results (Max) for the variable of graphomotorical skills and verbal fluency. Through the canonical discrimination analysis and t-test, differences between students of both programs covered by this research were calculated, while the connections among all the variables of this research were evaluated through Pearson correlation coefficient.

## Results and discussion

### *Frequency and percentage of results obtained for groups of students of preschool education and students of English language and literature*

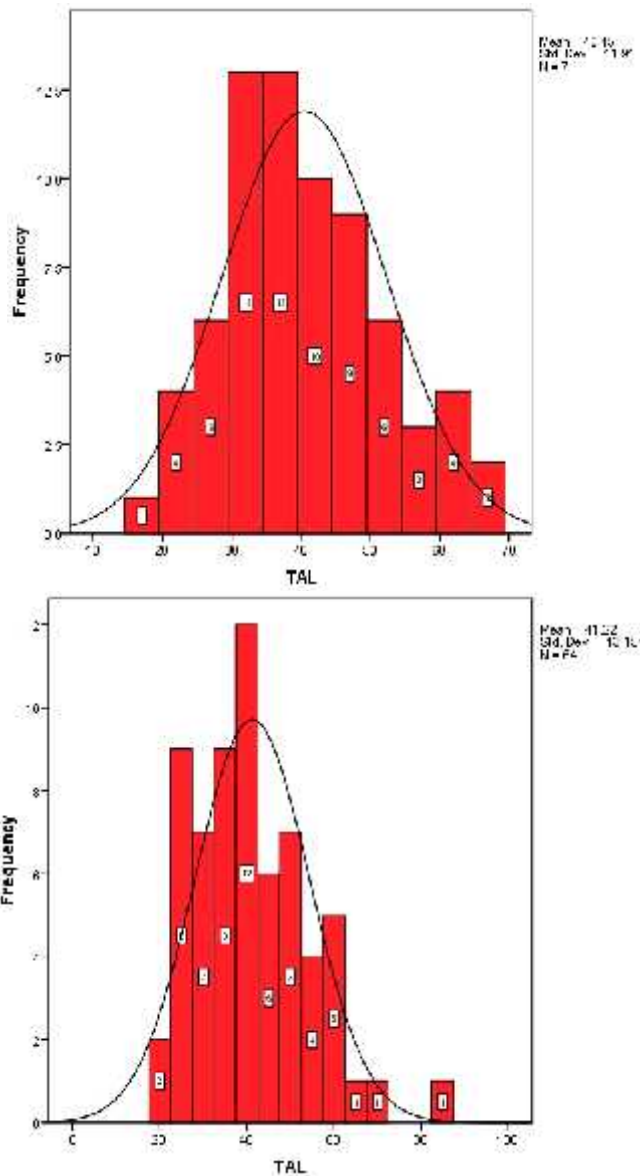
With an aim of elaborating in more detail the data collected through this research, analysis of frequency and percentage of results of the tested students has also been done, which are presented in respective tables and charts. For technical reasons, in Table 1, 2 and 3 only highest frequency and percentage of students are presented.

Table 1, respectively Chart 1, shows that out of the total number of 71 students of preschool education 26 (36.4%) of them have written mostly from 30 to 39 Albanian letters, while for the 64 tested students of English language and literature, results show that 12 (18.9%) of them have written mostly 38 Albanian letters (3 students), respectively from 40 to 42 such letters (9 students).

Table 1 Frequency and percentage of the variable of the test of writing Albanian letters for students of preschool education and students of English language and literature

Students of preschool education			Students of English language and literature				
TAL	Frequency	Percent	TAL	Frequency	Percent		
<b>Valid</b>	30	3	4.2	<b>Valid</b>	38	3	4.7
	31	1	1.4		40	4	6.3
	32	5	7		41	4	6.3
	33	2	2.8		42	1	1.6
	34	2	2.8				
	35	3	4.2				
	36	5	7				
	37	4	5.6				
	39	1	1.4				
<b>Total</b>	<b>71</b>	<b>100</b>		<b>Total</b>	<b>64</b>	<b>100</b>	

Chart 1 Charts of the variable of the test of writing Albanian letters for students of preschool education and students of English language and literature

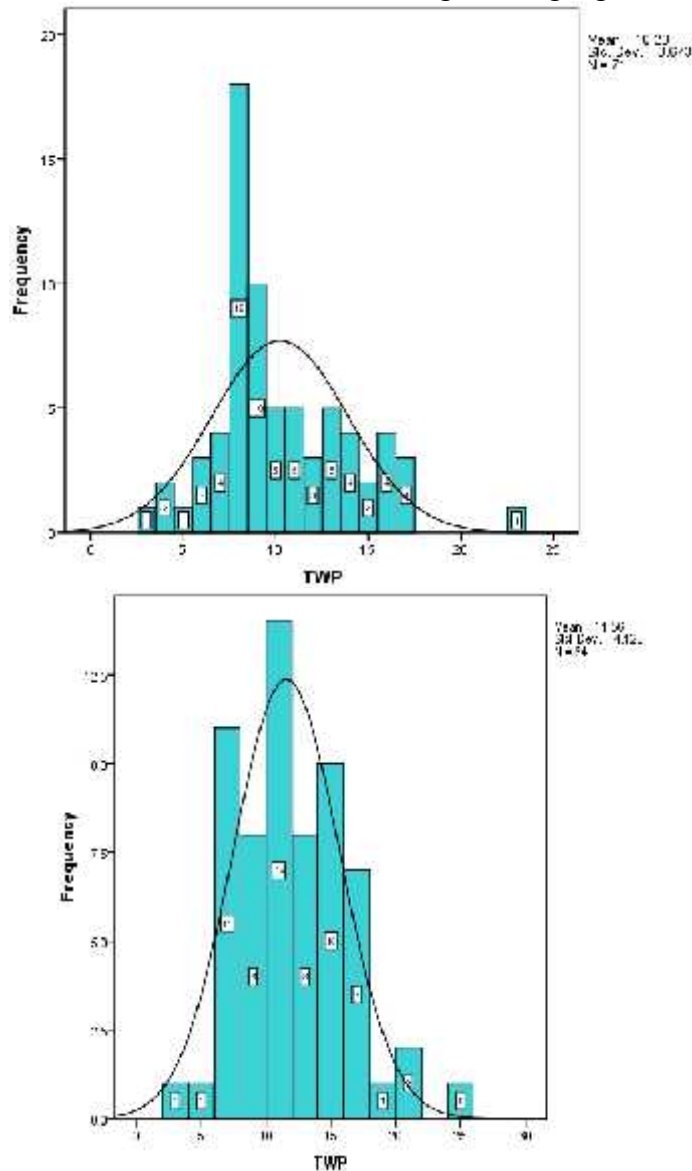


Frequency and percentage of students of preschool education and students of English language and literature in the variable of the test of writing words starting with letter “p” (TWP) are presented in Table 2, respectively Chart 2. The highest percentage of provided answers in this test for the students of preschool education are 25.4% (18 students with 8 correct words), respectively 14.1% (10 students with 9 correct words). On the other hand, the results of 64 students of English language and literature in this test show that 14 of them (21.9%) have 10 and 11 correct words starting with letter “p”, while 11 of them (17.2%) have 6 and 7 such words.

Table 2 Frequency and percentage of the variable of the test of writing words starting with letter “p” for students of preschool education and students of English language and literature

Students of preschool education			Students of English language and literature			
TWP	Frequency	Percent	TWP	Frequency	Percent	
Valid	8	18	25.4	Valid	6	4.7
	9	10	14.1	7	8	12.5
			10	5	7.8	
			11	9	14.1	
<b>Total</b>	<b>71</b>	<b>100</b>	<b>Total</b>	<b>64</b>	<b>100</b>	

Chart 2 Charts of the variable of the test of writing words starting with letter “p” for students of preschool education and students of English language and literature



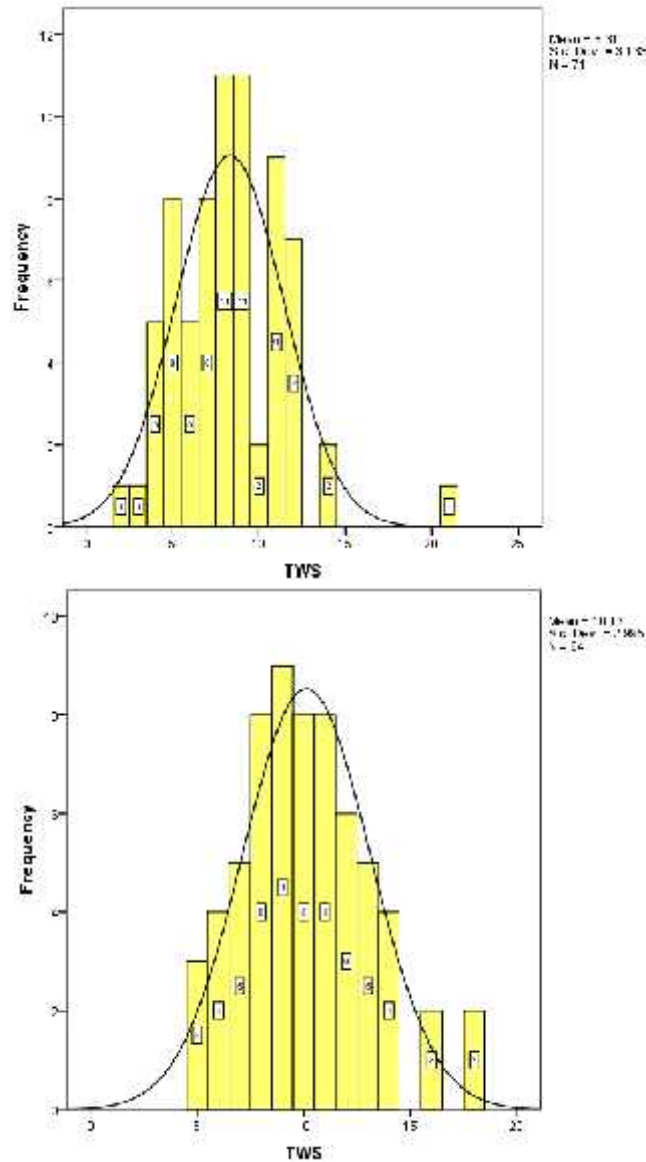
The analysis of data from Table 3 and Chart 3 shows that in the variable of the test of writing words starting with letter “s” (TWS), the highest percentage of provided answers in this test for the students of preschool education is 31.1% (22 students with 8 and 9 correct

words), respectively 12.7% (9 students with 11 correct words). As for the group of tested students of English language and literature, collected data shows that the highest percentage of provided answers in this test is 14.1% (9 students with 9 correct words), respectively 37.5% (24 students with 8, 10 and 11 such words).

Table 3 Frequency and percentage of the variable of the test of writing words starting with letter “s” for students of preschool education and students of English language and literature

Students of preschool education			Students of English language and literature			
TWS	Frequency	Percent	TWS	Frequency	Percent	
<b>Valid</b>	8	11	15.5	<b>Valid</b>	8	12.5
	9	11	15.5		9	14.1
	11	9	12.7		10	12.5
					11	12.5
<b>Total</b>	<b>71</b>	<b>100</b>	<b>Total</b>	<b>64</b>	<b>100</b>	

Chart 3 Charts of the variable of the test of writing words start with letter “s” for students of preschool education and students of English language and literature



*Differences in graphomotorical skills and verbal fluency between students of preschool education and students of English language and literature*

In Table 4, results of canonical discrimination analysis of the three variables used in this research have been presented. The data obtained show that there are statistical differences (Sig = 0.010) between students of preschool education and those of English language and literature.



Table 4 Results of the canonical discrimination analysis of applied variables for students of preschool education and students of English language and literature

Discriminative Function	Canonical correlation	Wilks' Lambda	Df	Sig	C <sub>P</sub>	C <sub>E</sub>
1	.287	.918	3	.010	-.282	.313

Variable	r <sub>y</sub>	r
TAL	-0.097	0.993
TWP	0.092	0.576
TWS	0.963	0.103

With an aim of elaborating in more detail the obtained results through the canonical discrimination analysis, calculation of basic statistical parameters has been done: arithmetical mean ( $\bar{x}$ ), standard deviation ( $\sigma$ ), standard error of arithmetical mean ( $\sigma \bar{x}$ ), minimal results (Min) and maximal results (Max), as well as, the t-test of applied variables for both tested groups of students.

Table 5 Basic statistical parameters for the applied variables and the results of t-test for students of preschool education and students of English language and literature

Variable	Students of preschool education					Students of English language and literature					t-test	2 Tail Sig
	$\bar{x}$	$\sigma$	$\sigma \bar{x}$	Min	Max	$\bar{x}$	$\sigma$	$\sigma \bar{x}$	Min	Max		
TAL	40.45	11.91	1.41	17	69	41.22	13.15	1.64	20	85	-0.356	0.722
TWP	10.23	3.67	0.44	3	23	11.56	4.13	0.52	3	24	-1.992	0.048
TWS	8.31	3.13	0.37	2	21	10.13	3.00	0.37	5	18	-3.432	0.001

Elaboration of obtained results from Table 5 shows that there are no significant statistical differences between the groups of students in the variables dealing with graphomotorical skills, respectively in the test of writing Albanian letters (TAL), where the validity of the t-test (2 Tail Sig) is 0.722. However, there are significant statistical differences in favor of students of English language and literature in the variables of verbal fluency, respectively in the test of writing words starting with letter "s" (TWS) and in the test of writing words starting with letter "p" (TWP), where the validity of the t-test is 0.001 and 0.048.

*The connection between the variable of verbal fluency for the groups of students of preschool education and students of English language and literature*

Pearson correlation coefficient was used to examine the scale of correlation between the two applied variables of verbal fluency for the groups of students of preschool education and those of English language and literature.

As seen from the results presented in Table 6, among the students of preschool education, the two variables of verbal fluency (TWP and TWS) have high correlation among themselves (0.538).

Table 6 Correlation between the applied variables for students of preschool education

Correlation		TWP	TWS
<b>TWP</b>	Pearson Correlation	1	.538**
	Sig. (2-tailed)		.000
	N	71	71
<b>TWS</b>	Pearson Correlation	.538**	1
	Sig. (2-tailed)	.000	
	N	71	71

\*\* . Correlation is significant at the 0.01 level (2-tailed)

Examination of obtained results from Table 7 shows also that there are statistical correlations (0.514) between the variables: the test of writing words starting with letter “p” and the test of writing words starting with letter “s”.

Table 7 Correlation between the applied variables for students of English language and literature

Correlation		TWP	TWS
<b>TWP</b>	Pearson Correlation	1	.514**
	Sig. (2-tailed)		.000
	N	64	64
<b>TWS</b>	Pearson Correlation	.514**	1
	Sig. (2-tailed)	.000	
	N	64	64

\*\* . Correlation is significant at the 0.01 level (2-tailed)

Based on the results presented in Tables 6 and 7, it can be concluded that the degree of correlation between the applied variables that assessed verbal fluency is higher for both groups of the tested students.

## Conclusions

In this research, 135 students of the Faculty of Education in Pristina, respectively 71 from preschool education program and 64 students of the Faculty of English language and literature were included. All tested students were in the third year of studies.

With an aim of assessing graphomotorical skills, the following tests were applied: the test of writing Albanian letters, while for the assessment of verbal fluency, the test of writing words starting with letter “p” and the test of writing words starting with letter “s”.

Initially, frequencies and percentages of all applied test were analyzed, showing that in the test of writing Albanian letters (TAL), out of the total number of 71 students of preschool education, 26 (36.4%) of them have written mostly from 30 to 39 letters, while for the 64

tested students of English language and literature, the results show that 12 (18.9%) of them have written mostly 38 letters (3 students), respectively from 40 to 42 such letters (9 students). The highest percentage of provided answers in the test of writing words starting with letter “p” (TWP) for the students of preschool education is 25.4% (18 students with 8 correct words), respectively 14.1% (10 students with 9 correct words). On the other hand, the results of 64 students of English language and literature in this test show that 14 of them (21.9%) have 10 and 11 correct words that start with letter “p”, while 11 of them (17.2%) have 6 and 7 such words. In the variable of the test of writing words starting with letter “s” (TWS), the highest percentage of provided answers in this test for the students of preschool education is 31.1% (22 students with 8 and 9 correct words), respectively 12.7% (9 students with 11 correct words). As for the group of tested students of English language and literature, the collected data shows that the highest percentage of provided answers in this test is 14.1% (9 students with 9 correct words), respectively 37.5% (24 students with 8, 10 and 11 such words).

By means of the canonical discrimination analysis, it can be concluded that there are statistical differences (Sig = 0.010) between the tested students studying preschool education and those of English language and literature.

The results obtained through the t-test prove that there are no differences among the tested groups of students in the variable of the test of writing Albanian letters, while there are significant differences in the variables of the test of writing words that start with letter “p” and the test of writing words that start with letter “s” in favor of students of English language and literature.

Results of this research also confirm that the degree of correlation between the applied variables that assessed verbal fluency is high for the both groups of tested students.

Finally, based on all the results of this research, it can be concluded that, in general, preference of students of English language and literature is more towards language compared to the students studying preschool education. Therefore, in order to increase attentive selection of students according to their abilities for the relevant programs of higher education, it is recommended to continue with further research in the area of graphomotorical skills and verbal fluency.

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