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STATISTICAL RESEARCH OF PREFERENCES OF STUDENTS OF THE MOSCOW PEDAGOGICAL STATE UNIVERSITY IN LECTURES¹

Abstract: The aim of this study is to investigate the preferences of Russian students in the way of learning in lectures. The paper provides an answer to the following research question: "How to teach?" students in the modern condition. The results are a real scientific fact. Statistically proven that students of the Moscow Pedagogical State University do not prefer the auditory way of learning in lectures. The result is very high statistically significant (99.9%). The result of the study may be useful at the input stage of the reform of Russian Higher Education, including for the formation of training programs for teachers.

Key words: student's preferences, process of education, lecture, way of learning in lectures, auditory way, visual way, Russian Higher Education.

Introduction

New sources of visual information are breaking into life again and again. There are TV, Internet, mobile phone, social networks etc. in the last 50 years. You see, social media has been gaining a foothold in education². Teachers use

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¹ The article contains test results that are part of the scientific project WPL_BS_Economics and management of educational systems and processes, 2018 carried out at the Pedagogical University in Krakow.

² Y. Wang, U. S. *State Education Agencies' Use of Twitter: Mission Accomplished?* SAGE Open, Volume: 6 issue: 1, 2016, <https://doi.org/10.1177/2158244015626492>

social media to create an alternative platform of instruction³ and build professional learning communities⁴.

Of course, this affects young people. Students use social media to complete homework-related tasks and maintain friendship⁵. The youth of Russia has changed. The youth of Russia use the achievements of technical progress. Their way of thinking changes after the emergence of new gadgets.

It is the auditory way of learning, which dominates in the lectures for a long time. It was in Ancient Greece. And it is everywhere now⁶. Auditory learning is a learning style in which a person learns through listening. An auditory learner depends on hearing and speaking as a main way of learning⁷.

An auditory learner is the student that's able to recall information by simply hearing it. They may or may not feel the need to take notes because they excel at processing information by sound and usually have excellent memories⁸.

Visual learning is a style in which a learner utilizes graphs, charts, maps and diagrams⁹. The visual learning style, often referred to as the spatial learning style, is a way of learning in which information is associated with images. This learning style requires that learners first see what they are expected to know. People with a visual learning style are often referred to as visual-spatial learners.

From the other hand, young Russian people have changed. Young Russian people are following technological advances. Their way of thinking is changing. Various studies report that 75 of all information processed by the brain is derived from visual formats. Furthermore, visual information is mapped better in

³ S. Aydin, *A review of research on Facebook as an educational environment*. Educational Technology Research & Development, No. 60, 2012, p. 1093-1106; J. Kurtz, *Twittering about learning: Using Twitter in an elementary school classroom*. Horace, No. 25(1), 2009, p. 1-4.

⁴ V. Cho, J. Ro, J. Littenberg-Tobias, *What Twitter will and will not do: Theorizing about teachers' online professional communities*. Learning Landscapes, No. 6(2), 2013, p. 45-62.

⁵ S. Weeden, B. Cooke, M. McVey, *Underage children and social networking*. Journal of Research on Technology in Education, No. 45, 2013, p. 249-262.

⁶ *Formi i metodi obuchenia*, https://vuzlit.ru/439916/formy_metody_obucheniya, access: 02 March 2018.

⁷ M. J. Kostelnik, A. K. Soderman, A. P. Whiren, *Developmentally Appropriate Curriculum: Best Practices in Early Childhood Education* (3rd ed.). Columbus: Pearson, Merrill Prentice Hall, 2004.

⁸ J. Carnevale, *Auditory Learners*, <https://study.com/academy/lesson/auditory-learners-definition-characteristics.html>, access: 03 May 2018.

⁹ *Visual learning*, https://en.wikipedia.org/wiki/Visual_learning, access: 21 March 2018.

students' minds¹⁰. And it is possible that students do not prefer an auditory way of learning by now.

The auditory learning style enables auditory learners to learn best by hearing or through verbal communication. Auditory learners are good at remembering what they hear as they learn information through auditory representation. Auditory components such as tone, pitch, and loudness are all important to these learners¹¹.

The aim, materials and methods

The aim of the study is to answer the question: do Russian students prefer the auditory way of learning in lectures?

The main research methods were questionnaire survey, statistical processing of questionnaires, verification of statistical hypotheses. We did not use the methods of sociological research, we used the methods of statistical research. The questionnaire was created at the Pedagogical University in Krakow. The main question discussed in the paper was: What way of learning in lectures do I prefer?

There were three possible answers:

1. The teacher has a presentation, and I write with a slide show.
2. The teacher slowly dictates, and I write.
3. The teacher quickly says, and I note.

The first answer refers to the visual way of learning in lectures. The second and third answers refer to the auditory way of learning in lectures.

The methodology of statistical research was borrowed from the source¹².

The study was carried out in Russia since January till October 2018. We used well-documented and powerful methods of analysis. All of our methods were economically justified. The survey was attended by students of Moscow Pedagogical State University (MPSU).

Preserving traditions MPSU entered the new, XXI century, having perspective and promising plans for the future and they are inclined to improve the

¹⁰ R. Williams, *Visual Learning Theory*, 2009, http://www.aweoregon.org/research_theory.html, access: 28 March 2018.

¹¹ Fil. Kayalar, Fet. Kayalar, *The effects of Auditory Learning Strategy on Learning Skills of Language Learners (Students' Views)*, IOSR Journal of Humanities and Social Science (IOSR-JHSS), Volume 22, Issue 10, Ver. VII, 2017, p. 04-10.

¹² *BUS_9641_Business_Statistics_3*, Textbook for the Program "Masters of Business Administration" – USA. NY. Kingston University, 2010, p. 42.

system of pedagogical education in Russia and contribute to the development of pedagogical sciences on the international level¹³.

November 1, 1872 is the date when in the former building of the first College for Men in Prechistenka st., under the initiative of top-tier professors, headed by V.I. Gerye, the Moscow Courses for Women (MCW) were organized. It was the first Higher Education Establishment for women at those times. Starting from 1874 women started for 3 years such disciplines as Russian and Foreign literature and history, physics, mathematics, ancient and modern languages. In 1900, there were two departments: historic – philosophical and physic – mathematical. In 1906, the third, medical department was founded.

In 1912 the post – graduates of MCW were allowed to carry on research work that was important for Russian science and emphasized the role of women in it. Four years later the diploma of MCW was equal to the one of the Moscow State University. Eminent scientists worked in MCW: N. D. Zelinsky (the inventor of the gas – mask), P. A. Minakov (one of the founders of forensic medicine expertise), M. N. Shaternikov (the founder of the physiology of nourishment), A. K. Kots (the founder of Darwin Museum of Natural History) and many others.

In 1918, MCW got the title of the Second Moscow State University. During the period of Russian revolution some fundamental points of pedagogical science were investigated. The pedagogical department was founded in 1921. Among its outstanding professors were P. P. Bolonsky, L. S. Vigodsky, S. T. Shatsky, O. U. Shmidt. At that time the second MSU started preparing teachers for village schools and work practice was introduced as well as the guidance of schools and kindergartens.

In 1930, the second MSU became the first pedagogical institute in the Soviet Union. In 1934 Moscow State Pedagogical Institute (MSPI) comprised a few departments:

1. language and literature,
2. history,
3. physics and mathematics,
4. natural studies,
5. geography,
6. pedagogical,
7. defectology.

Today, MPSU de facto remains the "main pedagogical University of the country", combining the efforts of colleagues from other pedagogical universities and classical universities, which also train teachers. On the basis of MPSU

¹³ *History of MSPU*, <http://mpgu.su/ob-mpgu/nasha-istoriya>, access: 14 May 2018.

there is an Educational-methodical Association (UMO) on education in the field of training of pedagogical personnel. Representatives of the University are involved in the development and adjustment of conceptual state documents that determine the development of not only pedagogical education, but also the Russian education system as a whole. On the basis of MPSU the Commission on award of awards of the Government of the Russian Federation in the field of education annually works [History of MSPU 2017].

Tabela 1. Characteristics of respondents

Specialty	Number (M/F/n-a)	Training form	University
History teacher, bachelor course	21 (11/8/2)	full-time	Moscow Pedagogical State University
Primary school teacher, bachelor course	24 (0/23/1)	full-time	
Speech therapy, bachelor course	27 (1/25/1)	full-time	
English and French languages, bachelor course	16 (2/14/0)	full-time	
Political science, bachelor course	12 (7/4/1)	full-time	
Total number of respondents:	100	-	-

Source: Own survey.

MPSU is really representative university in humanity disciplines. So the University was a choice for the research.

The characteristic of respondents is given in Table 1.

Thus, there were 100 respondents from Moscow Pedagogical State University (MPSU) who took a part in the survey. It was five groups of respondents humanitarian disciplines. These were full-time students of a bachelor course.

Results

The results of primary and statistical processing of questionnaires are given in Table 2. The value "0" is assigned to the auditory way of learning for statistical calculations. The value "1" is assigned to the visual way of learning in lectures. Answer №2 and answer № 3 were combined for the study.

Table 2 shows that the expected value in five groups of respondents is more than 0.50. At the same time, the table does not give a clear idea of students' preferences.

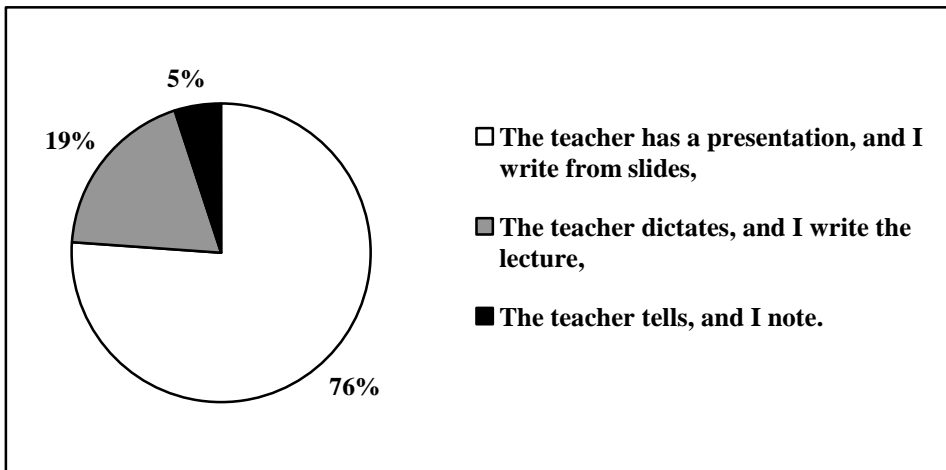
For this purpose, the ratio of the audio and visual ways of learning is shown in Figure 1 and Figure 2.

Table 2. The results of processing of questionnaires (number of choices of different responses)

Specialty	The number of choices			\bar{X}	δ_x	δ_{x-1}
	response 1	response 2	response 3			
History teacher, bachelor course	14	5	2	0.67	0.47	0.48
Primary school teacher, bachelor course	18	6	0	0.75	0.43	0.44
Speech therapy, bachelor course	22	4	1	0.81	0.39	0.40
English and French languages, bachelor course	15	1	0	0.94	0.24	0.25
Political science, bachelor course	7	3	2	0.58	0.49	0.52
Number of respondents:	76	19	5	-	-	-

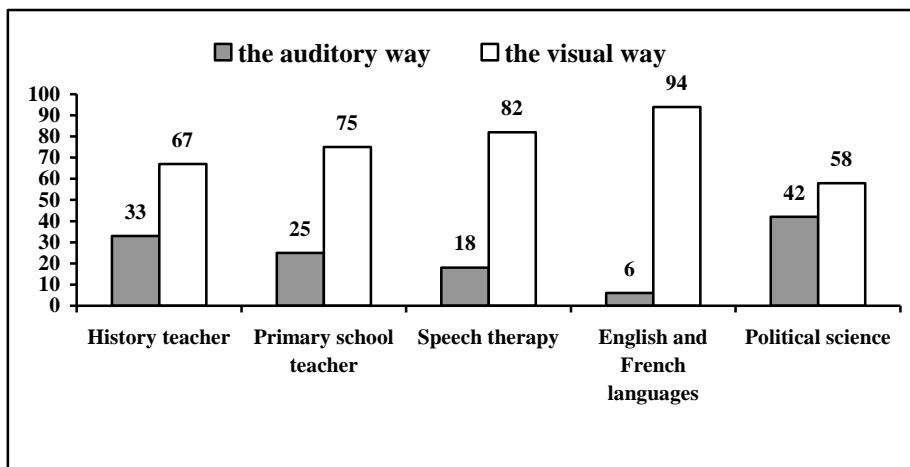
Source: The results of own calculations.

Figure 1. The total number of choices of the auditory way and the visual way of learning, %



Source: The results of own calculations.

Figure 2. The number of choices of the auditory way and the visual way of learning by specialities, %



Source: The results of own calculations.

Figure 1 shows the overall situation in five groups of respondents. It shows that the auditory way of learning does not dominate in the preferences of MPSU's students (24%). The figure shows that the visual way of learning dominates in the preferences of MPSU's students (76%).

Figure 2 shows the situation in each of five groups of respondents. Answer №2 and answer № 3 is combined for the study. Figure 2 shows that the auditory way of learning does not dominate in the preferences of MPSU's students (6%-42%).

The visual way of learning dominates in the preferences of MPSU's students (58% - 94%). Are they the new students' preferences? May be, may be, not. Figure 1 and Figure 2 are not the basis for a strong proof.

That is why two alternatives were considered at the stage of verification of statistical hypotheses:

1. MPSU's students prefer the auditory way of learning in lectures.
2. MPSU's students do not prefer the auditory way of learning in lectures.

Next step covers verification of statistical hypotheses to determine students' choice: MPSU's students prefer the auditory way of learning in lectures

Hypothesis testing: MPSU's students prefer the auditory way of learning.

Null hypothesis $H_0: \mu = 0.0$.

The null hypothesis argues that the unknown average of the general population of MPSU's students $\mu = 0.0$. The null hypothesis sounds: MPSU's students

prefer the auditory way of learning in lectures, if you do not take into account random deviations.

Alternative hypothesis $H_1: \mu \neq 0.0$.

The alternative hypothesis argues that the unknown average of the general population of MPSU’s students $\mu \neq 0.0$. The alternative hypothesis sounds: MPSU’s students do not prefer the auditory way of learning in lectures, if you do not take into account random deviations.

Table 3 shows data for the verification of statistical hypotheses for $\mu_0 = 0.0$.

The size t_{stat} more than value t_{tabl} for the level of significance 99.9% (Table 3). Therefore, we accept alternative hypothesis: the unknown average of the General population $\mu \neq 0.0$. This means, MPSU’s students do not prefer the auditory way of learning in lectures, if you do not take into account random deviations.

For the level of significance 99.9%¹⁴, the following result was accepted. According to hypothesis the General population of MPSU’s students does not prefer the auditory way of learning in lectures. Teachers should use visual ways to teach students in lectures. They are new clients' requirements to teachers.

Table 3. Data to verification of statistical hypotheses

Indicator	Group				
	History teacher	Primary school teacher	Speech therapy	English and French languages	Political science
the size of a sample, n	21	24	27	16	12
the expected value, \bar{X}	0,67	0,75	0,81	0,94	0,58
the standard deviation for the sample, δ_x	0,47	0,43	0,39	0,24	0,49
average error, $\hat{S}_{\bar{X}} = \delta_x / \sqrt{n}$	0,103	0,088	0,075	0,060	0,141
quantitative variable $ t_{stat} $ for $\mu_0 = 0,0, (\bar{X} - \mu_0) / \hat{S}_{\bar{X}}$	6,505	8,523	10,800	15,667	4,110
the value t_{tabl} for the level of significance 95.0,% ¹⁵	3,850	3,768	3,707	4,073	4,437 / 4,025*
Result, $ t_{stat} > t_{table}$	Yes	Yes	Yes	Yes	No/Yes*

* - the $|t_{stat}| > t_{table}$ condition is satisfied at a significance level of 99.8% ($t_{table} = 4,025$).

Source: The results of own calculations.

¹⁴ Ibidem, p. 75.

¹⁵ *BUS_9641_Business_Statistics_3*, op. cit., p. 42.

The tests gave the answer to the research question. This is proved statistically that General population of MPSU's students does not prefer the auditory way of learning in lectures. The result is a real scientific fact.

Can we trust the results of our research? This is a lot or a little, to poll 56 respondents?

At the stage of verification of statistical hypotheses about the preferred way of learning in lectures, the results are statistically significant (99.9%). The result indicates that the decision will be correct in about 99.9% of cases and wrong only in 0.1% of cases. In this sense, we have a decision-making process with accurate, controlled probability. We are sure that General population of MPSU's students does not prefer the auditory way of learning in lectures.

That is why the higher education system of Russia must not ignore the interests of students who do not prefer the auditory way of learning in lectures. This means that the Russian Higher Education needs a reform. This reform in higher education of Russia must reflect new students' requirements to lectures and teachers. It is necessary to equip all lecture halls with visual learning tools. It is necessary to train lecturers to use visual learning tools.

Conclusions

It was studied the preferences of MPSU's students in the way of learning in lectures. It is statistically proved that MPSU's students do not prefer the auditory way of learning in lectures. They are new students' requirements to teachers – teachers should use visual ways to teach students in lectures.

The result is very high statistically significant (99.9%). The result indicates that the decision will be correct in about 99.9% of cases and wrong only in 0.1% of cases. It means we have a decision-making process with accurate, controlled probability.

The result is a real scientific fact, which should be used in the reform of Higher Education in Russia. Among other things, we recommend to form new training programs for teachers. Teachers should learn to use visual ways of teaching students in lectures.

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BADANIA STATYSTYCZNE PREFERENCJI STUDENTÓW PAŃSTWOWEGO MOSKIEWSKIEGO UNIWERSYTETU PEDAGOGICZNEGO W ZAKRESIE WYKŁADÓW

Głównym celem przeprowadzonych badań naukowych było oszacowanie preferencji studentów rosyjskich w procesie zdobywania wiedzy na wykładach. Artykuł daje odpowiedź na następujące pytanie badawcze: „Jak się uczyć?” w nowoczesnych warunkach. Wyniki są prawdziwymi faktami naukowymi. Statystycznie udowodniono, że studenci Moskiewskiego Pedagogicznego Uniwersytetu Państwowego nie preferują audytornej metody nauczania na lekcjach. Wynik statystycznie bardzo wysoko znaczący (99,9%). Wynik badania może być pomocny w pierwszym etapie reformy rosyjskiego szkolnictwa wyższego, w tym do tworzenia programów szkolenia personelu naukowego-pedagogicznego.

Słowa kluczowe: preferencje studentów, proces uczenia się, wykład, metoda uczenia się na wykładach, słuchowy sposób, wizualny sposób, rosyjskie szkolnictwo wyższe.