

Chapter #16

DIGITAL ENGINES AT WORK: PROMOTING RESEARCH SKILLS IN STUDENTS

Olga Suleimanova, Marina Fomina, & Albina Vodyanitskaya

Institute of Foreign Languages, Moscow City University, Russia

ABSTRACT

The paper focuses on the digital teaching and research practices which make an indispensable integral component of upscale education. The authors compare traditional approaches to education against the much demanded by the society, promising approaches which heavily rely on the digital engines. Most relevant – education-wise – features of centennials / millennials, also referred to as “digital natives”, are taken into account. The digital teaching practices and digital research practices that can be used in teaching are outlined; teaching and research potential of some digital engines is examined. Corpus-based experiment along with the analysis of search engine results, cultural-linguistic research through Google and Yandex searching, Tropes Zoom’s content analysis and some other methodological novelties that can be used in the classroom as well as facilitate and substantiate the research results are analysed.

Keywords: education, digital, teaching, research, experiment.

1. INTRODUCTION

In the digital-age renaissance educators prepare learners with essential digital-age research skills, and integrate powerful digital tools (DT) into classes.

The authors focus on linguistic research in didactic perspective.

Key ideas what we focus on are:

- 1) ever growing awareness in the academic circles that research should make the integral indispensable component of upscale education;
- 2) in the ever changing environment many approaches to education are “stillborn” and rapidly grow outdated;
- 3) living in the digital age inhabited by centennials / millennials, also referred to as “digital natives”, calls for new approaches in education;
- 4) what digital teaching practices and digital research practices can be used in teaching.

The ideas we are going to promote here are: the world is rapidly changing towards digital global transatlantic happiness; it is to be taken into account in the education as it is the teachers’ responsibility to prepare young people to cope with it – through using DT for academic and research purposes, the research being one of the key education components.

In this section of the book the authors will briefly focus, first, on the state of affairs in the academic sphere as regards digitalization in education, then proceed to the problems people have to cope with in the rapidly changing world and the challenges these changes entail; after that, the specifics of modern students related to their “digital life” in the educational perspective will be tackled, and finally, the digital research strategies will be suggested that can motivate the students making research practices more efficient and even more enjoyable. These practices still need attending to and call for detailed elaborating.

2. ACADEMIC ENVIRONMENT

The academic environment as the most mobile sphere is answering the digital challenges the global world has to face nowadays. The academics reconsider time tested conventional teaching practices to adapt them to the digital environment (Feng & Duarte, 2019; Suleimanova & Vodyanitskaya, 2020), suggest new ones (Hamdani, 2018; Kimura, Ghahramani, Takeuchi, Iwata, & Ueda, 2018) and take advantage of them in teaching research skills to students (Chernyavskaya, 2018; 2019).

Let us focus on the research as the integral indispensable component of upscale education. It is an open secret that the education is getting more and more practically oriented, still – fortunately – the academic community persists in promoting research skills in students as it is the methodology and research techniques and methods that shape a modern specialist who is able to find solutions to the challenges the world offers today (Chernyavskaya, 2018; 2019; Diemer, 2011). In fact, research skills – in the broad sense – are the cornerstone in all kinds of human activity. The first researchers are newly born babies doing research all day long learning to survive in our world. The research competence is explicitly declared in the operating EMT (European Master's in Translation) standard as the leading reference standard for translator training, to be in effect until the year 2024.

The EMT standard specifies 35 crucial competences, which must be mastered by prospective specialists. Let us focus on some of them, and research-related ones among them, and reword some of the competences in a wider perspective – in addition to EMT requirement, or instead, he/she has to be able to edit the text, we would say, **process** the text in different formats with different purposes as the final requirement a translator / interpreter or a linguist is to meet is to generate a text – ideally in Queen's English, at least (providing there are no special stylistic requirements). We have to admit, however, that this competence is often seriously underestimated and even neglected (regularly by the so-called innocent translators, with no specialized education). Then a would-be linguist is to be able to explain and justify the translation choice. It implies that the translator should be on good terms with the linguistic and translation theories.

3. COPING WITH THE EVER CHANGING WORLD

Our next point is that the world nowadays is an ever changing environment in which we have to teach students correspondingly, while many running approaches to education are practically “stillborn” and rapidly grow outdated. We have to deal today with a New Learner who emerged some 15 years ago – it is IGeneration, Millenials, or Generation Y. M. Prensky admits: “Our students have changed radically. Today's students are no longer the people educational system was designed to teach”, referring to them as digital natives, digital immigrants (Prensky, 2001. p.1).

What makes the issue extremely complicated is that the world has, quite recently, started changing and whirling as fast as it never had before. The problem is, as many scientists claim, that the traditional institutions are not as flexible as we want them to be. It refers to education as well. Evolving educational landscape is getting less and less recognizable.

It is enough just to look around and see how rapidly it flip flops our traditional perceptions of time, finance, gender, even space which is getting, all of a sudden, unbearably and painfully global.

We are facing a dynamic combination of changing mindset, behaviors and skills – how to cope with this?

Greater access to the abundant information resources changes the learning trajectory focus from memorizing and listening to arming the learner with the tools that help get oriented in the information oceans.

E. Sheninger claims that now students are engaged in their digital worlds learning without us – professors (Sheninger, 2014).

Maybe they no longer need us? Or we should reconsider our roles and learn to navigate and pilot them through this digital world, domesticate that digital monster?

We argue, though, that it is still professors who can explain the basic points, the theoretical background and arm the students with the methods and methodology, teach them how to learn, how to extract info from and through search engines and pilot them towards the goal.

So, we are not going to be extinct, at least for some 100 years. If we cope with the changes. There are lots of strategies suggested for meeting the challenges of the changing world, to mention one of them.

The general strategy on how not to lag behind the learners, or to get “change savvy” (Herold & Fedor, 2008) involves:

- careful entry into the new suggested setting;
- listening to and learning from those (students included) who have been there or been at it longer;
- being enthusiastic, genuine and sincere about the changing circumstances – obtaining support for what needs to be fixed;
- developing a credible plan for making a fix or improvement.

We do not reproduce here the full list the author suggested, though the message is clear – the present-day professor must be open to changes. The point is that it refers to general principles while does not offer a tangible tool arming us, professors, with the practical guide to be used in class.

For example, today delivering lectures in the traditional way as *a sage on stage* makes little or no sense at all. Why?

1) Students are not motivated enough as they are only too well aware of the fact that they can refer (and actually **must** be sent) to abundant information resources at their disposal. The teachers’ responsibility here is to arm them with the routes, where to go and how to find what they need.

2) In the pragmatism world which we live in now, students are practically oriented – they need practical skills and knowledge on which they expect to survive in their professional life – *Do not give me fish teach me how to fish*, – as the old adage goes.

One of the practical tools of change which we tested with our students is Project-Based Learning (PBL) (Suleimanova, Yaremenko, & Vodyanitskaya, 2018; Fomina, 2018), directly relating to the discipline students are studying, instead of the end-of-the-term exams – it is the strongest motivator for a student, as well as for professors. PBL adds to the teambuilding, students learn to exercise the team spirit, they solve a practical problem, learn how to manage the research data. Besides – what is essential – practice public speaking, fight the stage fright, not to mention student satisfaction after invariably successful presentation of the project.

Pascal Finette (from Google) says that we live in “a culture of participation plus technologies plus networks” (Finette, 2012) that will in his opinion change the course of human history. It means teambuilding nowadays is one of priorities, to be promoted in education.

Another tool that changes the teaching practices is analytical interpretation – e.g., in teaching Theory of linguistics (which is not the most exciting discipline for sophomores), we may offer students a research object – e.g. a cluster of synonyms and ask them to analyse the research route within the frame of different linguistic paradigms: it is actually a traditional “what if” exercise applied in a new perspective. Students toy with research object in the cognitive / semantic, discourse or theory of speech acts or psycholinguistic or sociolinguistic perspective, then they are to elaborate corresponding research routes.

Now they know how to handle research in a variety of linguistic schools and approaches and, if needed, they will be able to draw data from different sources to prove their ideas. They grow multidisciplinary.

We also tried to delegate simple descriptive topics to students: they were asked (teamwork format) to prepare team presentations and in this way we may “kill quite a few rabbits”: students did search, arranged the information and delivered a presentation working as a team (instead of a boring professor drifting along the theme). There is also some competition between the teams and students are listening to each other with much greater interest than to a monotonous professor. In this way we delegate much work and creativity (quite a powerful motivator) to the students, and try to cope with “the wind of change”.

The list of the tools we apply is by no means exhaustive, and the idea to try and reconsider time honoured teaching instruments seems promising, though there still seems to be more questions than answers.

4. DIGITAL NATIVES

The digital learner prefers to network simultaneously with others, processes pictures, sounds, colors and video before texts; learns what is relevant, active, instantly useful and fun (Sheninger, 2014).

Today’s kids are born digital-born into a media-rich, networked world of infinite possibilities. But their digital lifestyle is about more than just cool gadgets; it’s about engagement, self-directed learning, creativity and empowerment (Finette, 2012; Sheninger, 2014).

We are immersed into this world whether we like it or not, we live in the digital-age renaissance and have to be in tune with the real world.

It is amazing how dramatically digital we are getting. Educators are learning (life-long learning – one more new popular concept) to be the catalysts for change and prepare learners with essential digital-age research skills, and integrate powerful digital tools into classes.

Let us look at the concept of a digital learner against a traditional educator. Digital learner prefers:

- to access information quickly from multi-media sources (educators prefer slow release of info from limited sources);
- parallel processing & multitasking (educators prefer linear processing, single tasks or limited multitasking);
- random access to hyper-linked multimedia information (educators prefer to provide information linearly, logically, and sequentially);
- to learn “just in time” (educators – “just in case”);
- instant gratification & immediate rewards (educators – deferred gratification & delayed rewards);
- **to network simultaneously with others** (educators – students to work independently before they network and interact);

- processing pictures, sounds, colors & video before texts (educators – text before others);

- **learning that is relevant, active, instantly useful & fun** (educators – feel compelled to teach memorization of the content in the curriculum guide) (bold type is added) (Sheninger, 2014).

As we can see, teamwork (=working simultaneously with others) and being practical and fun are emphasized. We are tasked with preparing students for success in a world that is becoming more dependent on technology, whether we like it or not. The good side to it is that it transforms universities into vibrant learning communities.

5. DIGITAL TEACHING PRACTICES & DIGITAL RESEARCH PRACTICES

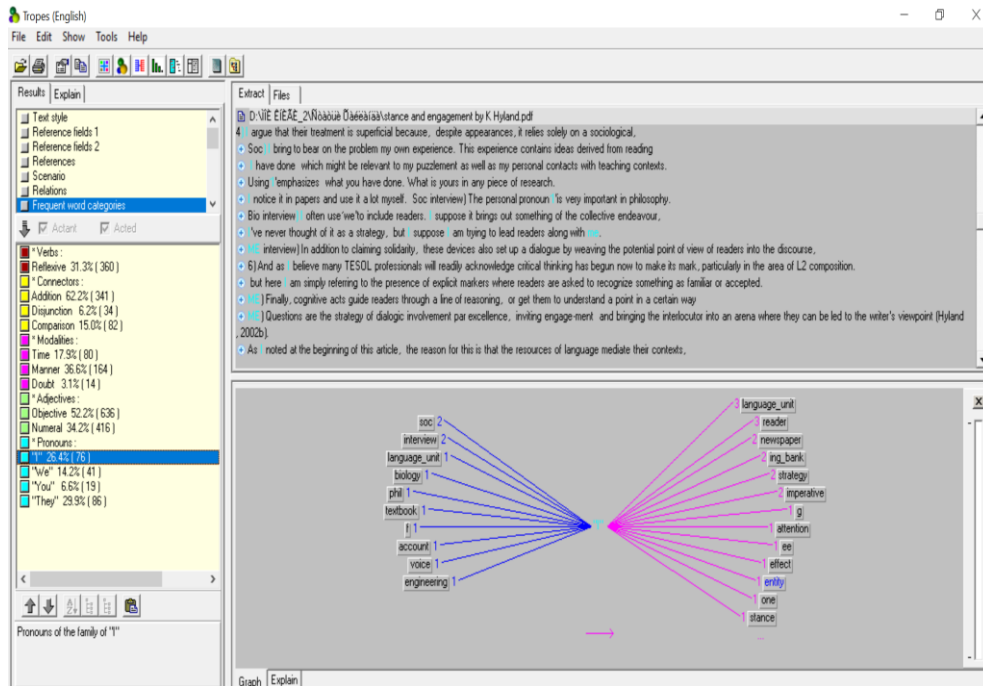
Digital engines can facilitate and substantiate the research results, not to mention the teaching practice where they make edutainment possible. Digital engines may be divided into **search** engine vs **research** tool: text analysis and linguistic experiment.

As a **search** engine Google and other big data resources, e.g. text corpora are used as a source of linguistic data which are time and resource efficient data acquisition and preliminary processing tools – through them functional style, discourse analysis can be effected.

What remains dramatically underestimated in teaching theory practice is the **research** potential: we can analyze the texts in a variety of perspectives, e.g.: *SentiStrength* which focuses on *Sentiment Analysis / Opinion Mining*, the system searches for emotionally charged vocabulary in the text (on the basis of the dictionary data) and evaluates the negative vs positive tone of the text (Suleimanova & Vodyanitskaya, 2020). Applicable in analyzing social networks communication; ranging along the intensiveness scale; compares the original vs translated texts as regards their emotional and evaluation contents. Another tool is *VAAL-mini* which evaluates subconscious emotional impact of phonosemantic structure of the text on recipient, predicts emotional response of the audience and exploits it when compiling the texts with the desired effect. Applicable in advertising (naming, slogans), analyzing individual speech characteristics, mass media texts. These powerful digital instruments empower the researcher with the means of analyzing “ready” text.

Consider a free desktop search engine and semantic analysis software from Acetic / Semantic-Knowledge – *Tropes Zoom* (now available in English, French, Spanish, Portuguese, Romanian) whose uses cover a wide spectrum ranging from content-analysis and defining stylistic register, chronology, communicators, parts of speech (frequency), key episodes, logical steps, modality, etc. to analysis of free-response questionnaires, studies of the effectiveness of advertising, monitoring changes to brand image, analysis of clinical interviews, behavioral studies, or analysis of literary works (<http://www.semantic-knowledge.com/>). Many research projects in theoretical disciplines such as theory of grammar, lexicology, introduction to linguistics, general linguistics rely on discourse analysis. The analysis starts with collecting the empirical data for the research. To collect the data (consider for instance stance and engagement expressions as linguistic representations of the category of subject) within content analysis “manually” (search options in Microsoft Word for .rtf or .doc(x) formats or Adobe Reader / PDF-Xchange Viewer for pdf files might be of some help still do not provide for the scenario – a frame of the text analysis) turns out to be a multi-hour monotonous, tedious task. *Tropes* can significantly facilitate the research procedure and reshape research methodology – e.g. all the statements with reader pronouns (*you*, *your* and inclusive *we*) as well as absolute and relative frequency of these “engagement” expressions can be easily extracted from the analysed text in no time (see Figure 1 for *Tropes*’s results).

Figure 1.
Tropes Zoom's results – absolute and relative frequency of pronouns.



We may also use Google, Yandex and other search engines' research potential for cultural-linguistic research, for example, while analyzing the word order in the attributive group to show that it is indicative of the national cultural practices (see Suleimanova & Petrova, 2020) for a detailed account of using big data experiments in cognitive and linguo-cultural research in English and Russian). For example, the request for “competing” attributive phrases *вкусная здоровая пицца* (*delicious healthy food*) and *здоровая вкусная пицца* (*healthy delicious food*) reveals the following statistics – *вкусная здоровая пицца* – 546,000 Google entries, while *здоровая вкусная пицца* – 738,000 entries. What follows is that the Russian cognitive practice admits existence of both delicious, and healthy food, but higher frequency of the class of delicious food (if this figure is taken as 100%) against healthy food (74%) means that for the Russian linguistic picture of the world it is more relevant to distinguish delicious rather than healthy food. We can also conclude that we have a more hedonistic vision than people in the English-speaking world, where these data are almost equivalent (935 and 939 million) with 0.4% difference, according to Google (see Table 1) (Suleimanova & Petrova, 2020, p.389-390).

Table 1.
Occurrences of the attributive groups 'вкусная здоровая пища' vs 'здоровая вкусная пища', 'delicious healthy food' vs 'healthy delicious food' in Google (accessed 10/2020).

Phrase	Google Search
<i>вкусная здоровая пища</i>	546,000
<i>здоровая вкусная пища</i>	738,000
<i>delicious healthy food</i>	935,000,000
<i>healthy delicious food</i>	939,000,000

What is more appealing in digital tools is that they offer research resources for **experimental** methods: in psycholinguistics, sociolinguistics, and semantics.

We can also verify semantic hypotheses, registering the number of acceptable phrases (instead of polling native speakers). In the linguistic experiment, corpus-based experiment and the analysis of search engine results are rapidly getting ground. While in linguistic experiment we obtain the so-called 'negative linguistic material' (the term used by L.V. Scherba), i.e. the sentences graded as unacceptable, the text corpora do not provide the researcher with marked sentences. Most frequently occurring search results are likely to be acceptable and preferred, while marginally acceptable and not preferred sentences are to be rare. To verify the hypothesis with corpora and Google big data, the researcher determines whether the corpora and Google experimental data complies with his/her predictions and expectations, and to what extent. So, in accordance with the expectations we get frequent search results with the word *empty* describing a physical object (a container, a cup, a stomach, a bottle, etc.) construed as three-dimensional physical space; and rare or no results with the word *blank* in these adjective-noun-combinations (see Table 2).

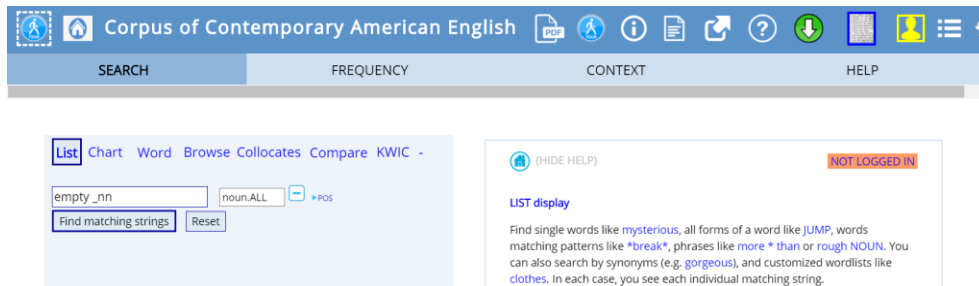
Table 2.
BNC and Google search results (accessed 11/2020).

	container (Google / BNC)	cup (Google / BNC)	stomach (Google / BNC)	cheque (Google / BNC)	screen (Google / BNC)	sheet of paper (Google / BNC)
empty	313 m / 4	472 m / 24	219 m / 51	17.1 m / 2	1.410 m / 2	177 m / 1
blank	130 m / 0	273 m / 0	0.048 m / 0	12.3 m / 38	757 m / 12	279 m / 20

Moreover corpus-based data can provide very useful insight into the meaning and usage of the words at the initial stage of the semantic research that consists in gathering information on their left and right distribution and valence characteristics (the results of this preliminary analysis enable the researcher to frame a hypothesis on the meaning of the

linguistic units). For example, in investigating semantics of adjectives *empty* and *blank* we can limit the search to noun collocates with a simple query *empty _nn* (*blank _nn*) (see Figure 2).

Figure 2.
Searching for collocates.



The search results (see Figure 3 and Figure 4) feature the most common nouns after *empty* and *blank* – nouns denoting a physical object (*a chair, a house, a room, a stomach, a seat, etc.*) typically construed as three-dimensional physical space after the adjective *empty*; and nouns denoting objects conventionally conceived of as two-dimensional flat objects (*a check, a page, a canvas, a screen, etc.*) after *blank*. In this case we can put forward a hypothesis on the meanings of the chosen adjectives, and then proceed to its experimental verification.

Figure 3.
Frequency of 'empty + noun' collocations.

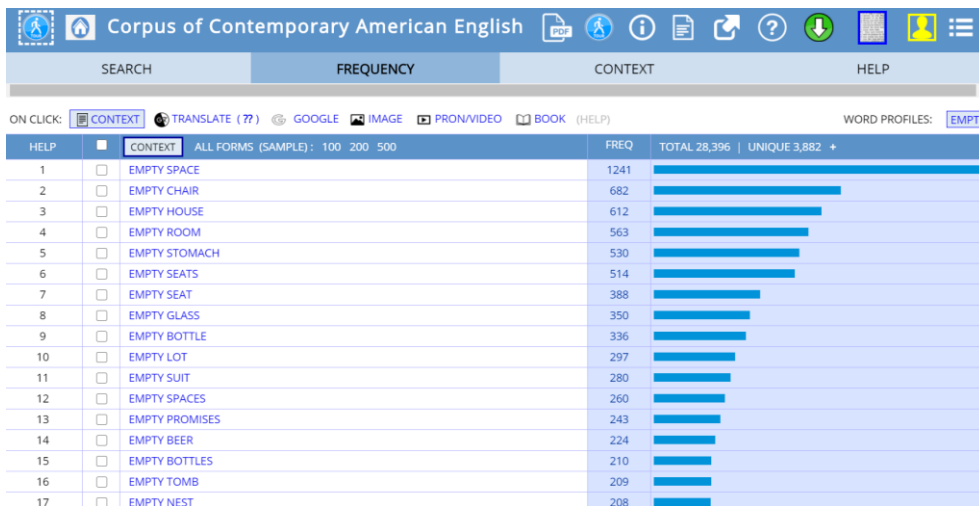
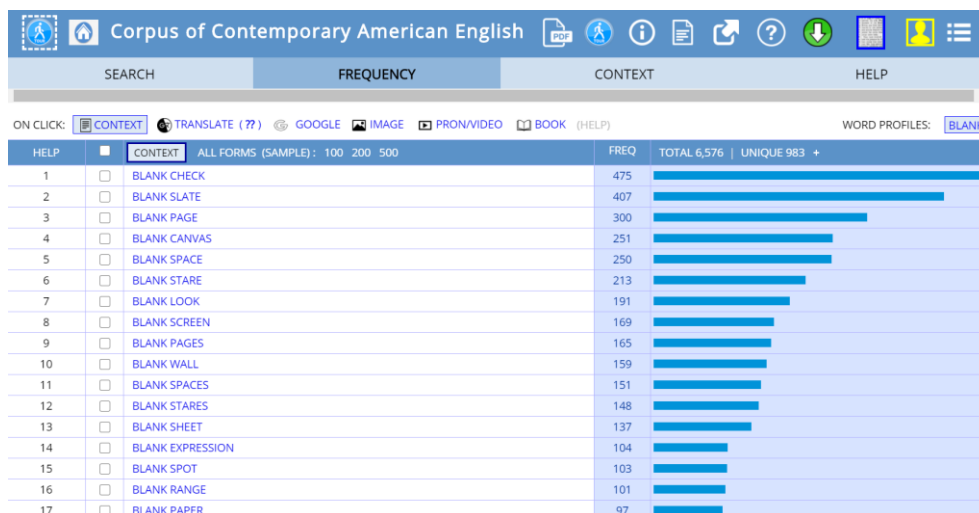


Figure 4.
Frequency of 'blank + noun' collocations.



Digital engines do reshape research methodologies. Actually, they are a challenge to the traditional polling psycholinguistic practices: e.g. associative experiment. Let us see how it works in the Mentimeter (MM). MM is the system that can process the polls online and represent immediately the results in a variety of graphic formats (about 10). Its VAT is that it is attractive with the younger generation (edutainment – students enjoy it at first when asked to use their telephones, they look puzzled as, normally, telephones are discouraged in class). See (Sheninger, 2014) for more digital tools (Twitter, Wordle, VoiceThread, etc.) used in the classroom.

6. CONCLUSION

The modern pedagogy emphasizes priorities, among those are accepting this “brave new world” of digital environment, being open to fast changes in the world. Living or rather surviving in the digital ambience, and enjoying it, an individual has no choice except mastering / fostering / befriending digital tools of all kinds. Digital engines reshape research methodologies as well as teaching research to the students.

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AUTHORS' INFORMATION

Full name: Olga A. Suleimanova, Dr. of Philology

Institutional affiliation: Institute of Foreign Languages, Moscow City University

Institutional address: 5b, Maly Kazenny pereulok, Moscow, 105064, Russia

Short biographical sketch: Olga Suleimanova is a Full Professor, Head of the Chair of Linguistics and Translation Studies, Institute of Foreign Languages, Moscow City University. She holds a Doctoral Degree in Philology. Her research areas are semantics and pragmatics, translation theory and practice, linguistic experiments.

Full name: Marina A. Fomina, Ph.D

Institutional affiliation: Institute of Foreign Languages, Moscow City University

Institutional address: 5b, Maly Kazenny pereulok, Moscow, 105064, Russia

Short biographical sketch: Marina Fomina is an Associate Professor, Chair of Linguistics and Translation Studies, Moscow City University. She holds a Ph.D degree in Philology. Her current research focuses on linguistic semantics, cognitive linguistics, linguistic experiments.

O. Suleimanova, M. Fomina, & A. Vodyanitskaya

Full name: Albina A. Vodyanitskaya, Ph.D

Institutional affiliation: Institute of Foreign Languages, Moscow City University

Institutional address: 5b, Maly Kazenny pereulok, Moscow, 105064, Russia

Short biographical sketch: Albina Vodyanitskaya is an Associate Professor, Chair of Linguistics and Translation Studies, Moscow City University. She holds a Ph.D degree in Philology (translation studies). Her current research focuses on evaluation and academic discourse.