Skills of Analyzing and Synthesizing Textual Information in University Students: Interdisciplinary and Intercultural Approach

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Abstract
One of the most important tasks that the field of higher education is facing in the epoch of information technologies is the formation of a new type of specialist who is a professional in one’s area of expertise as well as an informational erudite having the necessary skills to productively work with large flows of information. Presently, this task is far from completion. Two researchers, a journalist and a psychologist, with different cultural backgrounds combined their pedagogical experience and the results of long-term research of the contemporary university students. They studied their students’ abilities to analyze and synthesize information in the texts when performing various learning assignments, such as titling publications, annotating sources of information, and writing research papers. The results showed that most students in each specialty and culture had underdeveloped information skills, i.e. were informationally incompetent. Their mistakes were systematic and similar. The most difficult task for them was to identify key words, phrases and fragments in the texts. Consequently, such students had no full-fledged understanding of the semantic aspect of information. To denote this feature of cognitive activity of many university students, the authors the study used the term fuzzy thinking. The authors concluded that the educators’ efforts should be aimed at teaching university students how to work with texts professionally. Students in academia should be trained on developing skills to analyze and synthesize information because they are the main mechanisms which assure meaningful intellectual activity.

Keywords: information competence, analytical skills, textual information, fuzzy thinking, university students.
Introduction

One of the most important tasks which the field of higher education is facing in the epoch of information technologies is the formation of a new type of specialist. In addition to being an expert in one’s area of knowledge, such a specialist is an informational erudite having skills to productively work with large flows of information. Specialists of this kind can find the information needed for their professional activity in electronic libraries, classify, analyze, select data and make decisions about the reliability of information. At present, the task of forming such a specialist is still far from completion.

This task, if unsolved, can turn into a serious social problem that prevents progress. Problems can already be found today in representatives of different specialties and in different cultures, even technologically advanced societies. In this work, we discuss how these problems are manifested in students specializing in social sciences in some universities of USA and Russia.

Theoretical Frame

The concept of information competence (IC) appeared at the end of the last century in connection with the rapid development of information technology. It reflects the ability of a modern individual to adapt to new conditions of life and activity in the information environment.

*Information Competence* was viewed, first, as an essential characteristic of human activity related to the research in electronic libraries. Eventually, when the IC development programs were integrated into the curriculum of colleges/universities across the country, the definition also developed. In the Information Literacy Competency Standards for Higher Education (2000) we find that IC is the ability to a) determine information needed, b) access it efficiently, c) evaluate it and its sources critically, d) use it effectively for solving a specific task, e) incorporate it into one’s knowledge, f) access and use it legally and ethically. This definition with little variations can be found today in many publications available in the Internet (Smiths, 2007; Held, 2011; College of San Mateo Library, 2018).

There is also a broader definition: IC consists of “library literacy, computer literacy, media literacy, technological literacy, ethics, critical thinking, and communication skills”. This understanding of IC was documented and adopted by the Academic Senate for California Community Colleges (1998) and eventually by other US educational institutions. Similar definitions can be found in the works of Russian specialists (Udovik, 2011; Zaryeva, 2015).

The latter definition includes requirements for the psychological features included into IC. In our study, we adhere to this paradigm and focus on the role which cognitive processes play in the development of IC. It is necessary to consider such cognitive functions as analysis and synthesis, basic components of formal-logical thinking. They are the important cognitive mechanisms underlying IC. Another important type of thinking that is needed for effective work with information, specifically textual information is semantic thinking. Adequate operating with the meanings contained in the information is another cognitive mechanism underlying IC.
Authors of this paper speak about the IC of the university students in the fields of social sciences. IC is viewed here as the complex of cognitive skills required for working with textual information to perform daily learning assignments either with the use of information technology tools or without them.

Methodology

To collect empirical data, authors used methods of observing, conversations with students, and analyzing their intellectual work. Participant observation and conversations were the basic techniques for the study of the students’ learning activities in a traditional classroom of Moscow State University (McLeod, 2015).

In Touro University System, a combination of observation techniques and the analysis of the students’ research papers were used. Courses were conducted on the Internet. The participant observation was applied to check homework and discuss them with students in the asynchronous mode. The non-participant observation took place in some forums on the Discussion Board where the instructor, not being involved, checked the students’ collaborative work related to solving learning tasks. An analysis of the students’ papers was carried out with the use of a simplified version of the content analysis (Content Analysis, 2018).

Studies of the Skills for Analyzing and Synthesizing Textual Information

Titling a note

Country: Russian Federation
Educational Institution: Moscow State University
Department: Journalism
Course: Basics of Editing Media Texts
Students: Undergraduate level; seniors (the 4th year)

In the modern world which is overwhelmed with information, people, when looking at a title, want to understand what a publication is about and whether it makes sense to read it. Of course, the publications must meet this audience’s need (Gilyarevsky, 2003). The titles should be informative that is, it should provide the fullest possible reflection of the publication’s content (Inshakova, 2017). Informative titles for printed and electronic issues are important for all areas of mass communication: education, religion, culture, and even advertising, in which the accuracy of the commercial proposal determines the response of a future consumer.

Dr. Natalia Inshakova, one of the authors of this article, when she taught the topic “Work on the title”, used all forms of instructional methodology. She specified features and values of the informative titles in her lectures, demonstrated informative titles on numerous examples during practicums. In those classes, the students were familiarized with the strategy for analyzing titles and the algorithm for constructing meaningfully adequate titles (Gendina, 2013).

Then, the students received a small newspaper’s note for their homework assignment. Its title did not adequately reflect the content of the note. The students’ task was to determine whether the title was informative and propose a more informative one.
To formulate the title, it is necessary, first, to determine the topic of the note. The topic consists of three key-concepts: the subject of activity, the object of activity, and the event. The key-concepts have their textual indicators in the note. Identifying the textual indicators is a central part of any task of this kind; it cannot be solved without a proper analysis of the text. The note, key-concepts, and their textual indicators (highlighted in colors) are illustrated in Figure 1.

![Figure 1. The note and a sample of its correct analysis](image)

The study lasted from 2013 to 2018. The results showed that the search for textual indicators of key-concepts was difficult for the students. Identifying the event described in the note turned out to be especially hard. The instructor tried to find out the cause of it. When discussing with the students the results of their homework, she asked, “What is the note’s main event?” The most common answers were “publishing projects”, “publications for jubilee.” From semester to semester, most students were losing sight of the main event – they missed “the presentation”.

The students experienced even greater difficulties when they were composing their own titles for the note. These results are illustrated in Figure 2. The answers can be divided into 4 categories.

![Figure 2. Distribution of students between categories of answers across 2013-2018 years](image)

The category A represents correct answers. 5% of students proposed informative titles which reflected the essence of the note to the greatest degree: “Project Classical
The category B represents incomplete answers. 25% of students, although determined the specific aspects of the topic, proposed non-informative titles: “Textbooks for the jubilee of the University”, “Moscow University: publishing projects.”

The category C represents wrong answers. 30% of students did not cope with the task. They substituted it by offering the advertising titles: “In the jubilee with a new textbook”, “Learn, learn and learn!”. Quite often their titles were misinforming: “Age of maturity”.

The category D represents absence of answers. 40% of the students refused to perform the task considering the given title effective and believing that "nothing was wrong with unclear and incomprehensible titles". Many of them were also convinced that "to attract attention of the readers is more important than anything else". “You want us,” – they were saying to their professor, – “to create boring titles, but titles must not be boring!”

Drawing up an annotation

Country: Russian Federation
Educational Institution: Moscow State University
Department: Journalism
Course: Basics of Editing Media Texts
Students: Undergraduate level; seniors (the 4th year students)

The annotation is the next, – after the title, – step in informing the readers about the publication. Annotation is derived from the Latin word annotatio (note). An annotation is a brief description of the publication’s content and form: it has information about the publication’s main characteristics. In fact, any book or article in mass media, art, or science, – may be accompanied by an annotation; in English-language scientific journals it is usually called abstract. For some majors including journalism an annotation is an obligatory element for qualification works.

Dr. Inshakova in her lectures familiarized her students with requirements for writing an annotation and with technology of its composing (Suminova, 2001; Baryakina, 2018; Nikitenkova, 2018). The requirements were related to various aspects of the text which are mandatory for inclusion in the annotation. Namely: a) author, compiler, translator, b) genre, c) content, d) year of publishing, e) the composition of its reference apparatus, f) specific of publishing and printing form, g) the reader's address.

The students were also informed about the requirements for the literary format of annotation (Methodology of Composing Annotation, 2006), and about what is not allowed in the annotations: stamps, quotations from the text of the annotated work, exceeding the normative volume (600 characters).

Then, the students were offered an annotation to a published novel with a bibliographic description of the book: Lewis C. (2010). Till we have faces. Translated from English by I. Kormilsev. Moscow: Foreign Literature; B.S.G. – PRESS. 304 p.
*Till We Have no Faces* is a philosophical parable, a “retold myth”, by the author's own definition. The eternal story of Amur and Psyche raises eternal questions about the Fate of man and the nature of Love - and gives answers to them. 220 characters.

The students’ task was to find errors in this annotation and propose their own, more informative options. Acquaintance with the book was not a prerequisite for this assignment. However, students were recommended to search for missing and necessary information in the Internet.

The instructor, when analyzing results of the students’ work on this task, found the following:

1. Many students were able to detect errors in someone else's annotations, but they could not compose their own.
2. In the annotations drawn up by students, the most common mistakes were:
   a. absence of the main book’s characteristics (for example, on the account of its content).
   b. excessive amount of insignificant details and/or mandatory data (about the author, the circumstances of the creation of the work, etc.)
   c. lack of language discipline (verbosity, repetition, many words with undefined meaning)
3. In the average, only one third of students drew up informative annotations which met most formal requirements.

The short annotation given to students for their homework met only two formal requirements: it had the textual indicators of the book genre ("philosophical parable") and its content ("eternal story of Amur and Psyche"). So, the students generally completed the first part of the assignment. However, most of them still failed with the second part of it. Only about 30% of investigated population were able to compose an informative annotation which met from 6 to 9 formal requirements. One of the informative annotations with the highlighted textual indicators of formal requirements is illustrated in Figure 3.

![Figure 3. An informative annotation and a sample of its correct analysis](image)

**Writing a research paper**

Country: USA  
Educational Institution: Touro College & University System  
Department: School of Education and Special Education
The research paper (RP) is a kind of academic writing which aims to explore and communicate ideas and arguments and is based on the search of information in traditional and virtual libraries. (Difference between creative and academic writing, 2018; Types of academic writing, 2018). Currently, the RP is widely incorporated into the college/university curriculum. It is the most advanced and reliable form of testing learners’ knowledge and skills on a subject. An effective RP is an indisputable indicator of a student’s information competence.

Dr. Anna Toom, another author of this article, assigned RPs in her online psychology course which she taught from 2014 to 2016. Students wrote papers on the topic Comparative Analysis of Theoretical Approaches to Child Development and Learning.

The study was conducted in two stages. The first stage in which 81 students studied lasted during the summer and fall of 2014. The instructor guided students by her virtual lecture about specific features of the research paper as a genre and its difference from other types of writing. Additionally, the students were given certain requirements for the paper’s content and format.

The main criterion for evaluating the RPs was the quality of the comparative analysis of theoretical approaches carried out in them. Accordingly, all students’ works were divided into the following categories. They were papers in which a comparative analysis: was not done (category 1), was done incorrectly (category 2), was done correctly (category 3). An additional category was allocated, which counted non-submitted papers and those in which the topic was replaced (category 4).

Distribution of the students’ RP between categories is illustrated in Figure 4. Since the number of students in the summer and fall semesters was not the same, the data was normalized. Numbers of RP-s in categories are represented in percentages.

![Figure 4. Distribution of the RPs between categories across the two semesters, 2014.](image)

The two most significant results are as follows:
1. The most populated category in both semesters was compounded by the students who performed a comparative analysis incorrectly. Together with those who did not accomplish the task, they formed an overwhelming majority in the investigated population.

The distribution of the papers between the four categories appeared consistent from one semester to the next. Such a similarity of graphic compositions for different semesters indicated the reliability of the results.

These were the alarming facts. It looked like about 85% of our graduate students did not have sufficient analytical skills for accomplishing the final course work.

2. The second stage of this study took place during the 2015 and 2016 academic years. At this time, 222 students took the same course and wrote their RPs on the same topic. The only difference was in assigning a preliminary training for writing effective papers.

The new instructional methodology was based on the theory of G. Polya which explained how people should solve problems (Polya, 1973). According to Polya, to be effective, a solution of any problem must begin from the analysis of its statement; after that a plan for solving this problem should be developed, and finally, this plan should be executed. Our preparatory training included analysis of the topic’s statement and writing of the RP outline.

**Analysis of the topic’s statement.** Students determined: 1. Three basic independent key-concepts in the topic’s statement, 2. Semantic content of key-concepts, 3. Hierarchy of key-concepts. A fragment of this analysis’ results pertaining the key-concept *Theoretical Approaches* is shown in Figure 8. When the topic’s key-concepts were identified, the content of each was found, and their hierarchy in the statement was determined, the learners were required to write the research paper outline (Reamy, 2016).

**Figure 8. Results of analysis of the topic’s statement (fragment)**

**Writing the RP outline.** According to a common definition, “an outline is used to present main points (in sentences) or topics (terms) of a given subject” (Outline, 2018). Research paper outline done in full sentences gives a very accurate picture of what the students’ final paper will be about (How to Make an Outline, 2005). An
effective outline is a reliable indicator of a task’s understanding and a subject’s knowledge.

The main criterion for evaluating the outlines was the quality of the comparative analysis described in them. Accordingly, all submitted outlines were divided into four categories. They were the outlines in which a comparative analysis: was not done at all (category 1), was done superficially and cursory (category 2), was done in detail and in-depth (category 3). Non-submitted outlines made up an additional category (category 4). The distribution of the outlines between categories is illustrated in Figure 9. The numbers of RPs in categories are normalized and represented in percentages.

The three most significant results are the following:
1. The most populated category in both years was constituted by the outlines in which comparative analysis of theoretical approaches was included (on average 94.5%);
2. Most outlines were done in full sentences (on average 65.5%);
3. The distribution of the outlines between categories appeared consistent from one year to the next. The similarity of the graphic compositions for different years indicated the reliability of the results.

![Figure 9](image)

**Figure 9.** Distribution of the students’ RP outlines across categories (based on the quality of descriptions) and years (2015-2016).

**Discussion**

At the Journalism department of Moscow State University, the students solved different in genres, but methodically similar tasks: “find errors in someone else's solution and offer your own, better option.” The first part of the task required mainly analytical skills, the second part – mainly the synthesizing skills of processing information. The second part of the assignment was fulfilled by only 5% of students which solved the task “Titling a note” and 30% of those which solved the task “Drawing up an annotation”. This indicates insufficiently developed skills to synthesize information in most students of investigated population. Even the first part of the assignment was completed only if it was small in volume. This allows the authors to assume an insufficient preparation of investigated population of students-journalists for solving the tasks proposed in the course and students’ information incompetence.
In the American University, for successful completion of the assignment “Writing a Research Paper”, the graduate students lacked the same cognitive skills. In 2014, only 14% of learners who were taking the course Child Development and Learning in Cultural Context succeeded competently conduct a comparative analysis of theoretical approaches to child development. However, in 2015-2016, having passed a special training prepared by the instructor within the framework of this course, 85% of students accomplished this task when creating the paper outlines.

Analysis of the mistakes made by students in the performance of assignments allowed the authors to examine the features of the cognitive activity of students. The inability to compare two theories (in the research paper task) indicates underdeveloped skills of analysis and synthesis, problems of formal-logical nature. The inability to distinguish the important from the minor when searching and selecting data from electronic libraries (in the titling task), the tendency to use words with uncertain and vague semantics (in the annotation task), and, most importantly, the inability to find in the text indicators of concepts (in all the three tasks), – all this points to underdeveloped skills to operate with meanings, to problems of semantic nature.

The latter result is of especial scientific interest – due to insufficient research. Although, recently it was confirmed in the study of the students’ comprehension of a fiction story. Participants of that study had difficulties in understanding the semantic structure of the fiction story’s text (Toom, 2015).

This feature of our university students’ cognitive activity can be called fuzzy thinking. This means that they fail to distinguish important from unimportant, paramount from minor. Their understanding of the reading’s content is flat, there are no reliefs in it. As Gestalt psychologists would say, there are no figures on the background for them: everything is either a solid figure or a solid background. In such students’ mentality, many different concepts merge into one undifferentiated, confused picture. The authors suggest that a new instructional methodology is needed to teach young people a culture of perception and understanding of textual information.

Conclusions

This article presents the studies of authors belonging to different cultures and different fields of knowledge. One of the authors works in Russia, the other – in USA. One is a philologist, the other is a psychologist. One of the authors teaches exclusively in the classroom, the other – only online, and the tasks solved by their students in New York and Moscow were different. However, their results turned out to be surprisingly similar.

The university’s students specializing in journalism and education in both undergraduate and graduate levels demonstrated weak skills of analyzing and synthesizing the texts. They experienced difficulties when they were working with large flows of information, which is an indisputable indicator of their information incompetence. Moreover, for many learners it was difficult to identify the key words / phrases / fragments in the texts that is, to operate with meanings. Therefore, such students had no full-fledged understanding of the semantic aspect of information. The authors called this phenomenon “fuzzy thinking.” It deserves a thorough study.
However, the authors also showed that improvement of instructional methodology may lead to a significant improvement in the quality of the students’ work. Therefore, both learners’ various cognitive skills and information competence developed. To make it happen, special trainings are needed. One of such methods based on an application of the outstanding educational theory by G. Polya was demonstrated in this work.

The authors concluded that the educators’ efforts should be aimed at teaching our students how to work with texts academically and professionally. It makes sense to begin such teaching not in bachelor’s or master’s programs of the universities, but much earlier. In many ways, it depends on us, today’s educators, whether the younger generations will become information competent specialists.
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