

Professional precedent texts in teaching English for aerospace engineers

Inna Shafikova^{1,*}

¹Bauman Moscow State Technical University, 5/1, 2nd Baumanskaya st., Moscow, 105005, Russia

Abstract. The paper discloses the importance of professional precedent texts for teaching English to future engineers and researchers at a Master's degree program at a technical university. Three types of precedent texts found in scientific and technical articles are identified: classic precedent texts, term-type precedent texts, and professional precedent texts. It is stated that professional precedent texts have the greatest teaching potential. The most common genres of precedent texts for aerospace graduate students are review articles and original research articles in peer-reviewed journals. Criteria for the selection of professional precedent texts essential for teaching profession-oriented reading in aerospace departments of engineering universities are provided.

1 Introduction

Modern requirements for the aerospace industry development in the Russian Federation call for professionals of a new formation, capable of becoming a significant part of the global research and industry community. In order to function in the international engineering market, specialists must freely navigate the flow of scientific and professional information, which is impossible without mastering English as a second language. Professional precedent texts (PPT) are an important component of a specialist's linguistic persona. In order to answer the question of whether all texts of scientific and engineering discourse can be considered as precedent, what are the features that distinguish professional precedent texts from a huge array of scientific and engineering texts, let us turn to the history of the concepts of precedence and precedent texts.

Yu.N. Karaulov defined precedent texts (PT) as those that have emotional and cognitive significance for the user, classic or "textbook" texts, widely known and constantly present in discourse [1]. Initially, only quotations, the names of characters, the names of written works' and their authors' names were considered as the precedent texts. Subsequently, the boundaries of the precedent text category were expanded by including the texts that were significant for a narrow circle of people or known for a relatively short time [2]. In addition, the levels of precedence were identified depending on the scope of people using them. These levels are as follows: an individual, a member of society, a member of a national-cultural community and a member of the human race [3]. It is the existence of precedence at the level of an individual and at the level of a member of a certain community that makes it possible to consider non-classic, specialized texts, including scientific and professional texts

*e-mail: shafikova_inna@mail.ru

as precedent texts. Initially, and this was separately noted by Yu.N. Karaulov, scientific and professional texts were excluded from precedent texts due to the narrow specialization and low value of the former for a large part of society.

2 Types of professional precedent texts

Analysis of research on precedent phenomena in scientific and engineering discourse allowed us to identify three main approaches to the concept of a professional precedent text. It should be noted that in our study we focused on scientific and engineering precedent texts, without taking into account cultural precedent texts.

According to the first approach, precedent texts in scientific discourse are classic works, titles of articles and monographs, textbook illustrations and examples [4]. This approach is in line with the traditional concept of Yu.N. Karaulov, according to which the precedent texts belong to the general culture, in this case, professional culture.

Precedent texts in the form of intertextual inclusions (precedent phenomena in a broader sense) can perform various functions in scientific discourse: password, informative, evaluative, predictive, aesthetic functions. The password function means that references to certain texts can only be understood by members of a given professional group, forming a sense of group identity. The informative function allows the reader to inform the reader about other works in the relevant field of knowledge. The evaluative function of the precedent text gives the author the opportunity to express their attitude towards the described object or phenomenon. The predictive function is realized when the precedent text is in the title or epigraph of a scientific work, preparing the reader to perceive the text. The aesthetic function of precedent texts in scientific discourse is not the leading one and is rather rare. Here we can say that the author turns to a precedent text solely to emphasize the beauty of the wording and the originality of the image [5].

If we extend the functions of precedent texts to the scientific and engineering discourse, we can assume that the main purpose of intertextual inclusions in this case is to inform the reader about other scientific works on this topic, i.e. informative function. In addition, the precedent texts also perform a password function, allowing authors to identify and present themselves as members of the professional community.

A different approach to the types and functions of precedence in a scientific text is proposed by E.A. Bazhenova. A precedent text in scientific discourse is a “quantum of old knowledge” in the form of a term-type concept comprising an author’s name and a noun with a general scientific meaning (for example, the Pythagorean theorem, Fourier’s law, Planck’s constant, etc.) The use of precedent texts in this case is purely pragmatic, therefore, the cultural precedent texts of this type are almost non-existent. The precedent character of these texts is proved by the fact that they are not marked as quotations, are not marked with footnotes and are not referenced. Precedent texts of this type perform epistemological (a tool for systematizing, storing and transferring scientific knowledge), pragmatic (saving text space), social (indicator of belonging to the scientific community) functions [6].

The third approach to the professional aspect of precedence texts is enabled by the research by N.V. Petrova and S.V. Myskin. Based on the levels of precedence identified by Yu.E. Prokhorov, N.V. Petrova came to the conclusion that there are sufficient grounds to classify the texts that are significant for a scientist or a professional and are reflected in their own works as precedent texts and was the first to suggest using the definition of “precedent” for any text which is referenced in the analyzed text, and consequently for any research paper [7]. S.V. Myskin made a thorough analysis of the significance of PPT for a linguistic professional persona. Precedent texts play a key role in shaping the idea of professional activity, since they are the basis of specialized messages that condition and actualize such

activity. A key feature of professional texts is that they are intended not only for reading, but also for the subsequent transfer of their content in the language and implementation in objective activity [8].

In his seminal 1965 work, *Networks of Scientific Papers*, Derek Price shows that a huge body of contemporary scientific literature is “connected” with a small number of earlier works. The author calls such selected texts “active research front”, which in some way correlates with the notion of precedence. In addition, Price explains the withdrawal of scientific works from active citation by two opposite reasons: firstly, the decrease in the significance of scientific research, and secondly, such complete inclusion in the scientific context that the need for citation disappears and “obliteration by incorporation” occurs [9].

Thus, we can distinguish the following types of precedent texts in scientific and engineering discourse: classic scientific precedent texts, term-type precedent texts, professional precedent texts. In the English-language scientific discourse, we also note the category of precedence in the form of classic precedent texts and professional precedent texts. From our point of view, professional precedent texts have the greatest potential in English as a second language education, since their role in the actualization of professional consciousness makes them objectively significant for specialists, which undoubtedly increases the motivation for mastering a foreign language [10]. In addition, the absence of strict requirements for textbook and their fundamental nature (in contrast to the texts of the first type) makes it possible to select a larger repertoire of texts for teaching reading. The difficulty with texts of the first type (classic PTs) is that in order to select them, an English teacher requires a level of highly specialized knowledge comparable to the level of a scientist in a given subject area, or requires a high level of foreign language competence from specialized specialists who are potentially able to take on the role of a consultant. We do not consider precedent texts of the second type as the content of teaching English as a second language to future aerospace engineers, due to the low teaching potential of these texts: in most cases they are international and can be classified as eponyms—terms based on proper names.

3 Specific features of professional precedent texts in the aerospace industry

Let us consider the specifics of precedent in scientific and engineering discourse in the aerospace industry. Based on the fact that precedent texts in scientific and engineering discourse are manifested in the form of citations in new texts, we can assume the relationship between the presence of source texts in the space of scientific and technical discourse and their precedent significance. One of the famous authors in the field of scientometrics V.S. Lazarev notes that the value of scientific work can be assessed only based on its use, and the only tool by which this parameter is measured is citation [11].

After studying the citation patterns of a huge corpus of scientific articles, some authors suggest the citation half-life as the determining criterion of the popularity of an article. An article’s citation half-life is the period of time during which a publication receives half of its citations. This construct is used by the publishers of scientific journals in order to estimate the length of the embargo, that is, the prohibition of the author to publish the scientific work in the open access. The open publishing embargo allows publishers to maintain a monopoly on the scientific publishing market without losing their profits. However, studies of citation half-lives can help in understanding how scientific texts function and interact.

Davis and Cochran analyzed about 13.5 thousand scientific journals published by Thomson Reuters for the period from 1997 to 2013. The results of the analysis show that the average half-life of a journal’s citation is 6.5 years and annually increases by 0.13 years. As a

noteworthy trend, it was noted that, despite the increase in the cited half-life in most cases (the authors explain this by the increasingly fundamental character of applied research), scientific and engineering journals have a shorter cited half-life, which, moreover, tends to further decrease. However, the data on journals of some scientific and engineering topics (table 1), show that the cited half-period for scientific articles on aerospace topics is more than 8 years and has a slight tendency to increase [12].

Table 1. Cited half-life for engineering articles (from [Davis, 2015])

Category	Number of journals analyzed	Mean cited half-life	Growth per annum
Engineering, aerospace	315	8.27	0.09
Engineering, industrial	366	7.81	0.13
Engineering, manufacturing	288	6.60	0.13
Engineering, mechanical	1155	7.36	0.05
Engineering, multidisciplinary	608	7.71	-0.05

The study of the “age” of the cited articles in the field of engineering and technology showed that the spread of Web-based technologies had led to greater accessibility for the researcher not only of the latest, but also of older scientific publications. This trend applies mainly to computer science and economics. In scientific and technical publications in 2013, the number of cited scientific articles over 10 years in comparison with 1990 increased by only 3% and amounted to 34% [13]. Thus, we can conclude that the “usefulness period” of scientific and engineering articles is becoming longer due to modern information technologies, and the period of 5 years, established by some publications as a criterion for the relevance of a scientific source, is unreasonably short even for rapidly developing areas of technology.

A number of English-language studies devoted to the sources used in Master’s and PhD dissertations on engineering topics can give an idea of which texts are precedent for postgraduate students of foreign universities. The research carried out by the Library of New Mexico State University focused on the research papers underlying the PhD theses of graduate students in engineering. The researchers examined the structure of bibliography for three time periods; the first segment belonged to the pre-Internet era (1989–1991), the second to the transition period (1999–2001), and the third to the era of the accessible Internet (2009–2011). An analysis of the sources showed that free access to the Internet led to a twofold (compared to the pre-Internet era) increase in the number of links to scientific journal articles, the number of links to network resources also increased, as expected, the number of links to books decreased by almost 3 times. As a result, the structure of the list of references in technical theses is as follows: scientific articles—70%, books—10%, conference materials—9%, websites—3%, official documents and state standards—3%, dissertations—1%, other—2% [14].

4 Criteria for selecting professional precedent texts in Master for Engineering programs

Based on the argumentation of S.V. Myskin concerning the mutual transitions between the actual professional text and the original text (i.e. precedent text), namely, that the precedent text and the new text created on its basis should coincide not only lexically, but also structurally [8], we come to the conclusion that the PPT, which are presented to future specialists,

should belong to the same types as the texts that they themselves have to create in the course of their educational or professional activities. We distinguish the following types of English-language professional case texts required by a graduate student of a technical university:

- review articles of a general nature in the specialty;
- review articles on the research topic;
- original research articles on the topic of research;
- patents;
- instructions and user manual for machinery and equipment.

Taking into account the individual and social levels of precedence of a professional linguistic persona, we propose the following criteria for the selection of professional precedent texts for reading in English:

- relevance of the specialty and the topic of scientific research (name, keywords, abstract);
- citation index (for scientific articles, monographs, books);
- scientific authority and importance of authors (H-index, number of publications, affiliation);
- the authority and quality of a scientific publication (impact factor, quartile);
- year of publication (on average, not older than 10 years, an exception can be made for fundamental works in a certain area of knowledge).

The analysis of scientific research on the problem of precedent texts made it possible to identify the texts with highest potential from the point of view of profession oriented teaching of a foreign language. These are scientific and engineering texts that are significant for a particular researcher and contribute to the actualization of professional consciousness and a professional linguistic persona. The main genre of professional precedent texts for Master's degree students in engineering disciplines in general and aerospace in particular are original research articles in peer-reviewed journals, which they use when preparing their own publications and Master's degree thesis. The selection criteria for English-language PPT make it possible to individualize the process of teaching undergraduates in profession oriented reading in English. The lack of research on such a significant topic demonstrates the urgent need to develop a methodology for teaching PPT reading in English.

In conclusion, it should be noted that the international nature of modern science and technology requires a researcher and engineer to be actively involved in scientific and professional communication in a global context. In order to speak the same language with the world community, it is necessary to rely on a common body of knowledge, which is contained in professional precedent texts.

References

- [1] Yu.N. Karaulov, *Russian language and language personality* (URSS, Moscow, 2010)
- [2] G.G. Slyshkin, *From text to symbol: linguistic and cultural concepts of precedent texts in consciousness and discourse* (Academia, Moscow, 2000)
- [3] Yu.E. Prokhorov, *Reality. Text. Discourse* (Flinta, Nauka, Moscow, 2004)
- [4] V.I. Karasik, *Language circle: personality, concepts, discourse* (Peremena, Volgograd, 2002)
- [5] O.B. Adaeva, *Philology. Theory & Practice*, **7(18):I**, 22 (2012)
- [6] Ye.A. Bazhenova, *Perm University Herald. Russian and Foreign Philology*, **3**, 32 (2010)
- [7] N.V. Petrova, *Vestnik IGLU*, **2(10)**, 176 (2010)

- [8] S.V. Myskin, *Philology. Theory & Practice*, **10(40):III**, 134 (2014)
- [9] D.J. Price, *Science*, **149(3683)**, 510 (1965)
- [10] G.V. Sorokovykh, *Increasing motivation to learn a foreign language*, Proceedings of International scientific and practical conference of teachers, postgraduates, students and practitioners “Actual problems of social stratification and transformation in modern conditions”, 16 October 2020, Penza, Russia, 452 (2020)
- [11] V.S. Lazarev, *International Information Forum*, **42(1)**, 3 (2017)
- [12] P.M. Davis, A. Cochran, arXiv:1504.07479 (2015)
- [13] A. Verstak, A. Acharya, H. Suzuki, S. Henderson, M. Iakhiaev, C.C. Yu Lin, N. Shetty, arXiv:1411.0275 (2014)
- [14] P.C. Johnson, *Collection Building*, **33(1)**, 25 (2014)