EVERYDAY PROFESSIONAL COMMUNICATIONS OF DIFFERENT GENERATIONS OF RESEARCH SCIENTISTS IN THE CONTEXT OF CLOSED RESEARCH COMMUNITIES

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ABSTRACT

The paper analyzes various types of communication between older and younger generations in a research environment. Based on the participating observation and narrative interviews methods, it is shown that the personality of a scientist is largely shaped by the social environment where it is located. The conclusion is formulated that in relatively closed scientific communities, everyday communication plays an important role in the adopting the specific values of the scientific community by the younger generation of researchers, as well as their training in professional skills. As the results of the study showed, the success of professional communications is largely ensured by the value of such a characteristic as “personal equation” (a term introduced by Polanyi). In those groups, where the parameters of a "personal equation," the older and younger generations of researchers are approximately equal, the relationships are characterized as the least conflict. And, on the contrary, where there was a significant gap in the parameters of “personal equations”, community members are more likely to encounter conflict situations. That negatively affects the field of scientific socialization of the younger generation of researchers.

Keywords: scientist, researcher, sociology of science, generation, everyday life.

1.INTRODUCTION

The current stage of development is characterized by the dynamism of transformations in different areas. Science is one of the main catalysts for social change. Science as a social institution is a fairly young phenomenon, since it took shape into a full-fledged structure only about 300 years ago, when the first scientific communities appeared. The stability of such associations was determined by various forms of communicative practices between members and the building of relationships between established scientists and young researchers. At the moment, of particular interest are closed research systems (laboratories, research stations), which are developing in their own unique way.

Science and society are always have specific relationships: the interaction between scientists and the general public is often characterized by a latent axiological conflict and attempts to find a fragile balance between them. As a result, different ideas

are formed in the scientific community and society about how science works and what its socially significant goals are. For a long time, science was a fairly closed system, where foreigners were not allowed. People not included in this system did not understand what exactly was happening with science, and such factors, in turn, led to the fact that society exceeded expectations about science. According to A.N. Whitehead, science as a phenomenon and a social institution is a field of human activity aimed at developing and systematizing objective knowledge about reality (Whitehead, 1961). The development of science depended on the readiness of the minority, which believed in science, to fight for its common recognition and to express and develop openly their interest in science in its public discussion and purposeful unification.

A number of researchers note that the separation of science into a standalone structure and area is associated with the spread of scientism in the Renaissance era. In Italy of the 15th century, there was still a strong relationship between persons involved in the crafts of artists and philosophers (or natural scientist). Gradually, a transition to the emergence of a new image of a scientifically minded scholar (De Santillana, 1955) took place. The prototypes of modern scientific societies can be considered Italian "scientific" circles - academies of the 16th century - "The Unknown" (Naples, 1546-1548), "Keepers of Secrets" (Naples, 1560), Trusted (Bologna, 1548) (Ben-David, 1984). Those were circles of Italian intellectuals of their time. It is also worth noting the Academy dei Linchea, which can be considered the first circle that made an open and quite large-scale attempt to create a scientific institute that claims equal status with other educational institutions (De Santillana, 1955). Modern societies are already forming in the era of the New Age, when the Royal Scientific Societies are being created.

Initially, all scientific societies were closed systems, which gave rise to rumors and superstitions that these were associations of magicians or sorcerers. The actions of the first scientists of the Middle Ages and the New Age were incomprehensible to society, they were perceived more as something unnatural. Scientific communities have their own classification; they can be closed and open (Stepin, 1989). Open societies are formed under the strong influence of the external environment, are more susceptible to structural transformations (for example, universities, academies of sciences), and are large in size. Closed societies retain their original structure for longer, are small in size, members of such a society more often communicate with each other than with “newcomers” from the external environment (laboratories, observatories, research stations).

2.METHODS

Closed scientific communities are the most complex, but also the most interesting object from the point of view of the information received. The concept of "closeness" is rather conditional: within the context of our analysis, the closeness of a particular social institution is considered as the degree of difficulty of the researcher’s access to observation due to certain institutional reasons. One of the most effective research methods for such groups is the method of participating observation, the classic examples of which are the studies of I. Hoffmann, U.F. White, L. Festinger, M. Mead, and others. (Maximova, 2011).

The scientist’s personality is formed by the social environment where he/she is located. A.V. Yurevich noted that any communication between scientists passes through the prism of social and intrapersonal experience (Yurevich, 2001). Scientists pay

attention not to the objects studied, but to the scientific activity itself, comprehending and explaining its social circumstances. J. Gilbert and M. Malkay found that scientists' explanation of their professional mistakes is markedly different from their explanation of similar mistakes made by colleagues. Own mistakes were described as the influence of external factors, while the mistakes of other scientists were interpreted as due to personal characteristics (Gilbert, Mulkay, 1984).

In this paper, we consider the problems of communication between scientists and young researchers in closed research communities as the main factor in the sustainability of these entities. The sustainability of any community is achieved, first of all, by the continuity of generations, which in the academic environment is provided by the support of the "grand-theory" by all members of the association. The generation of new knowledge and the transfer of experience is carried out through communication of the older generation of scientists with novice researchers.

We conducted the study based on qualitative methods: participating and non-participating observation, interviews, visual methods. Two groups of scientists and researchers acted as an object of observation: botanists while working at a research station (Tomsk region), physicists in a laboratory (research of KFU, Republic of Tatarstan). Also, members of the student scientific society of the Naberezhnye Chelny Institute of KFU were monitored to determine how the formation of future researchers in the persons of 1-3 year students of technical specialties occurs (N = 15 people, each group).

3.RESULTS AND DISCUSSION

The first research association was located in the Tomsk region at one of the research stations. Scientists work in small groups, in which there is always a leading scientist uniting several like-minded people (scientists), forming together the "top" of their hierarchy. Also included in the group are young researchers who have just crossed the threshold of this research system. Noteworthy was the case in the group of botanists in the course of the sorting of plants: “A young researcher who had practice at the research station participated in the sorting of plants along with other botanists. The whole process was accompanied by talks about different types of plants and a demonstration of the process of proper sorting (professional). At certain points in the speech of scientists with experience, it was possible to notice questions of a personal nature that reduced stress (everyday). Initially, the young researcher’s movements were jerky and nervous, gradually becoming calm and confident, like those of the older generation... ”(from the field observation diary). This example illustrates the synthesis of everyday and professional in the process of transferring experience from one generation to another, which serves as a factor in the sustainability of these research systems. The use of everyday forms of communication in professional communications accelerates the process of socialization of young researchers in these conditions, which allows us to move on to new stages of the research hierarchy in such societies.

The second stage of the work was devoted to the study of communication features among physicists. At the stage of participating observation, we set a goal to find out how professional knowledge is transferred between young researchers from different areas of physics (laser physicists, cosmologists, theoretical physicists (optics and nanophotonics). “For two weeks every day we interacted with these individuals, tried to understand the meaning of their conversations.We spent with some physicists

24 hours a day... At the end of our experience, we discovered that we began to better understand the basic principles of physics, were able to penetrate into string theory and more often became interested in physics..." (from a field observation diary). Such inclusion in the activities of the studied community led to the fact that one of the observers became actively interested in physics, and decided, if possible, to receive a physicist education in the future. The next stage of the study included narrative interviews and non-included observation in one of the research laboratories of KFU. It is worth noting that in one of the premises of the laboratory a whole family of laser physicists (a couple and siblings) was discovered. "The relationship between the siblings, an older sister and a younger brother, working in the same room, is interesting. The older sister acts as a mediator and mentor for her brother. The sister is already a junior researcher, while her brother is still working as a design engineer. The brother helps in the experiments of the sister: monitors the growth of crystals, captures the data of the experiments. The sister is already independently conducting experiments or participating in the projects of her supervisor. Her husband also helps her with experiments... "(from the field observation diary). In total, up to five young physicists can work indoors. In the laboratory, they can spend about 14 hours monitoring the progress of the experiment. The crystals grow for a long time, and only after that the scientists begin to conduct experiments with them, testing different methods of pumping the laser. Collaborations of scientists from different universities working in one project are often found (parts of the study are carried out by various groups of scientists at other universities, and then are combined). "The older generation of researchers is highly respected among young people who strive to use informal communication in everyday life" (from a field observation diary).

Among physicists, everyday forms of communication are often used to facilitate the implementation of professional communications. Also, young researchers are already capable of conducting independent research. Although, it is not always possible to verify in practice the data of "mental" experiments due to the lack of necessary equipment: "... The older generation of physicists sometimes complains that there are no necessary facilities, since they are very expensive. For example, they mentioned that some mirrors for lasers can cost about 2.5 thousand dollars, and generally, the cost of a full-fledged installation for the experiment reach about 6 thousand dollars... " (from the field observation diary).

Sometimes, in the process of interaction between different generations of physicists, some omissions may arise due to different experience or the presence of problems concerning equipment among young researchers. As Maslow noted in one of his works, "a scientist is not a video camera or a tape recorder" (Maslow, 1966).

If the previous examples illustrated the communications between already established researchers, the social interactions between members of the student scientific society can be described as the first step in science and research. We monitored the student scientific community of future engineers. It is worth noting that their research projects are more focused on the development of practical solutions and real inventions. So, the project "Formula-Student" was implemented, within the framework of which a racing car was being built over a period of time; the work was carried out under the guidance of experienced scientists and designers with the participation of students. In such societies, students receive initial experience in research teams, and in the future, they become capable of participating and organizing their own research projects. In this case, we examined the communication between

scientists and novice researchers in the person of students, as well as the level of their involvement in the activities of the municipal society of young researchers. Communication with teachers and mentors was carried out through participation in joint research activities, which were often of a theoretical nature.

On the basis of the municipal society of young researchers, classes on the philosophy and methodology of scientific research were organized in the most informal setting. The so-called “intellectual tea parties” were held, where a variety of scientific directions were discussed. For six months, interested students attended these classes weekly, and they studied in small groups. “There were heated discussions during these conversations. However, the guys did not come only during classes, they were ready to spend the whole day there discussing the latest scientific ideas and achievements with eyes burning with delight. There were frequent cases when first-year students helped third-year students with subjects. At such moments, the board was completely strewn with mathematical or physical formulas. At times, software students could demonstrate their first neural network. They were ready to help each other and organize themselves in order to come up with research projects on their own... " (from the field observation diary). In a public association, where the chairman was 6–9 years older than their activists, communication was carried out on an equal footing. In this type of society, everyday communication prevails, through which professional skills training takes place.

4.SUMMARY

Observation and its results depend on the state of the senses of an observer. This phenomenon is caused by the manifestation of the so-called “personal equation”. “Personal equation” is an integral characteristic of the psychophysiological characteristics of a person, setting the limit of his/her sensory abilities. Each researcher is characterized by an individual “personal equation” that determines his/her ability as an observer (Polanyi, 2005). Results of our research have shown, the haste of professional communications is largely ensured by the value of this characteristic. In those groups where the “personal equation” parameters of the older and younger generations of researchers were approximately equal, the relationships were characterized as the least conflicting. And, on the contrary, where there was a significant gap in the parameters of “personal equations”, we were more often confronted with conflict situations. For example, in the course of the observation, cases were recorded when a senior researcher could remove a junior study from work under the pretext of slowness of the second, instead of helping a novice colleague to master the skills that are difficult for him.

5.CONCLUSIONS

Thus, the formation of a young scientist’s personality may differ depending on the type of research system. In conditions of closed research communities, a young researcher integrates into the scientific community not only through official channels for transferring scientific knowledge, such as lectures, practical classes, seminars, but also through informal communication with the older generation of scientists in the process of professional everyday practices.

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