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## **SCIENCE AND EDUCATION IN GERMANY: POSTDOCTORATE SYSTEM**

### **Annotation**

The short survey introduces a reader to a general concept of the postdoctoral research period. The postdoctorate is defined as a next step for promoting young scientists who pursues the academic career with the goal to occupy a professor position. In particular, its features in the German educational and scientific system are presented in detail. The qualification requirements and conditions of applications for a postdoctoral position are listed. The material is based on the work experience of the author, as a postdoctoral at universities of the Western Europe.

**Key words:** postdoctorate, education abroad, postgraduate, science in Germany, qualification promotion, university, R&D, international collaboration

**Кілт сөздер:** докторантурадан кейінгі, шетелдік білім, жоғары білімнен кейінгі білім, ғылым, біліктілікті арттыру, докторантура, Германиядағы ғылым, халықаралық ынтымақтастық.

**Ключевые слова:** постдокторантура, зарубежное образование, послевузовское образование, повышение квалификации, докторантура, наука в Германии, международное сотрудничество.

### **1. Introduction**

At many western universities the young scientists after defending their PhD theses and winning a philosophical degree decide to continue their research career in the sector of education and science. They could choose the postdoctoral period as a next stage for promoting their qualifications. It should be noted that the postdoctorate is not a permanent job, but rather temporal occupation. During this period a researcher gains his or her further experience in the given field of activity developing skills and responsibilities for leadership [1]. The final goal of the postdoctoral period is to become an independent status of the experienced scientist who is able to conduct own laboratory or own research group, even a whole institute. As a leader he or she would be capable to solve certain autonomic problems, apply for various research grants and accomplish entire scientific projects. It is natural that a postdoc simultaneously working under various projects must take part in the education process, teaching classes for undergraduate students, constantly giving lectures, seminars and labs on various subjects, e.g. general physics, electricity and magnetism, relativity etc. In comparison to our educational system a postdoctoral

position in the western universities is a kind of mixture of the research and teaching work. At the same time his/her affiliation is limited in time, because the post is defined as a non-permanent.

For example, in Germany after postdoctoral time the researcher pursues to get a position of professor at some university, which is usually a permanent job. It is interesting to note, that a title of professor in contrast to our conventional qualification system does not exist in Germany, except of honor degrees given by a university for outstanding persons for their famous achievements, e.g. Nobel laureates. In fact, these persons are not affiliated permanently at the university. Usually, in order to enter a competition pool for a professor position, candidates should have their habilitation work finished. The latter means preparing and defending, in its turn, the habilitation thesis, followed by earning the degree Doctor Habilitat (briefly Dr. habil.).

Due to enormous number of the highly qualified candidates a professor position in Germany is very difficult to win. An announcement for competition for a free place, called conventionally “an opening” collects a dozen of the applications, and could reach a level even over hundred. Taking this into account, many German academicians after completing their PhD or postdoctoral periods leave research realm and try to find their chance in industry or somewhere else. Some part of the flow finishing the postdoctoral pertains to work in R&D community, e.g. in various investigation structures, research institutes and laboratories. The rest seeks for their career continuation beyond of the science and education.

## **2. Features of the postdoctorate in natural sciences**

- Depending on subject postdoctoral period in the western countries lasts during three-five years, as a rule. The time length is influenced by such factors as financial budget to get, a possibility of project prolongation, to what extent the hosting university and/or research institute or hosting professor are interested in getting a certain candidate.

- A postdoctoral student – briefly postdoc - has got a scientific supervisor, in other words, postdoc boss. Usually the supervisor serves as a director of the institute or laboratory, a head of a chair, or even a regular full professor. It is very seldom that a postdoc has no scientific supervisor

- A postdoctoral student may spend his/her PD time in various universities. It is up to him to choose a certain place to continue the applied project.

- Looking at the research process in German educational system, one observes that, for example, a professor on physics or mathematics supervises a group consisting of 2-3 postdocs and 3-5 PhD students. Of course, these numbers may vary from subject to subject, from field to field. Except of the professor position the staff of the institute comprises a secretary, a system administrator for computer cluster and a lecturer or a tutor responsible for classes given for graduate students.

- During the PD period a postdoc should publish a series of significant papers on his/her research or project topic. It is imperative that the publications appear in well-known journals or strongly referred scientific magazines or periodic. The best would be to submit a review to a journal for experts with high impact factor or to release a book. In physics, the number of the publications amounts about 15-20. That means the activity of a postdoc is estimated in average by 5-7 papers per year, including two or three papers in journals with the highest impact factor. It is desirable that from quarter to half of this number of publications the postdoc is going to be a single author. One of the important criteria of the activity of a scientist is the Hirsch index. The index is the number of the publications of a given scientist, those publications being cited not

less than the same number of citations. In some aspects, the Hirsch index is similar to the citation index of the author. The higher the Hirsch index, the bigger chances to get a professor position or a permanent position in a scientific institution and/or in R&D sector in industry.

- For German postdoc it is important to gather an experience abroad, in foreign countries [2]. It should last one-two years. Popular destinations are universities and institutions in the USA, Japan, England and others.

- Beyond the scientific investigations, postdocs and PhD students during semester are involved in teaching activities, conducting classes and labs, giving lectures and seminars for students of bachelor and master levels. Sometime this issue of their occupation and responsibility is firmly defined in their working contracts.

- Besides, each postdoc tightly collaborates with one or two PhD students from the group of the hosting professor, monitoring and controlling their theses to be done. In fact, the chief supervisor delegates to postdocs his responsibility for PhD students, determining general directions and aims for research projects to accomplish.

- Postdocs regularly take part at international conferences and workshops, presenting there the results of the research activities. Financial support for travel stems either from the source of the institution, where the postdoc is affiliated, from the project funds, or from the third party, for example foundation or private company, to which one should submit an application for sponsoring.

- It is specific for Germany that postdoctoral period is followed by the completing the habilitation. The habilitation thesis is a necessary condition for getting an open professor position. Every person has right to apply for a postdoctoral position regardless of age, sex, and religion.

- One of the conditions for financing a postdoc with the salary to be noted is the maximal number of years gone after awarding the last academic degree. This a certain limitation promoting young academicians with relatively fresh career achievements. For example, the famous German science foundation called Alexander-von-Humboldt Stiftung supports the applicants, whose PhD theses has been defended not longer than four years in the past, while the Sofja Kovalevskaja Award requires even six years.

### **3. Financial funds**

- As a rule the financing is prescribed for a certain scientific project, which has been won by a supervisor. In Germany the postdoctoral positions can be supported by the grants from various foundations. The supervisors, professors and heads of the institutes choose the candidates for postdoctoral positions, proposing them work conditions, salary, etc. Sometime the top list contains good candidates, the competition is rather strong. It should be noted however, that some foundations do not require the supervision for postdocs, who have their rights to submit an application for a grant without a scientific boss. See, for example, the Deutsche Forschungsgemeinschaft and the Alexander-von-Humboldt Stiftung [3-5]. In addition, a postdoc may apply for several sources.

The procedure of the evaluation and approval process is carried out anonymously. Independent international committees of experts of a given field of science take a final decision.

The financing implies several important issues. They are the following:

1. The source, which pays salary to a postdoc defines its size, insurance, medical care, travel expenses, additional spending and so on.

2. Condition of the work contract consist of time length of the contract, possibility for prolongation, interruption, pausing and splitting into parts and over several work places, e.g. over different universities

3. The goals of the project applied, the time stages, calendar plan to fulfil. Particularly, it is clearly described when and how the project will be entirely completed.

4. Expenses for laboratory equipment, work set-up, computers, office items, materials, and so on.

Often the supervising professors apply for specific grants, definitely noting in the proposal with names of certain candidates, who is going to work under the project as postdocs.

The sources for financing a postdoctoral position in Germany may result from different places, even being beyond the university budget. First, these are foundations from so-called the “green list”. The list includes the Deutsche Forschungsgemeinschaft, Fraunhofer Gesellschaft, Helmholtz community, Alexander-von-Humboldt Stiftung (AvH), Max Planck Gesellschaft, Deutsche Austauschdienst and others. Secondly, various non-academical sources, private companies, corporation may give financial support for postdoctoral positions, for example, Bosch, Volkswagen-Stiftung, Siemens, Deutsche Bank.

In conclusion, in the present survey the general information about the postdoctoral study of the education system in Germany is given. Peculiarities of the conditions and requirements for occupation of a postdoc position are discussed. It provides however with no recommendations how to get successfully a scientific position at a German university. A comparative analysis between different countries of the Western Europe, which would be useful and necessary, will be given elsewhere.

## LITERATURE

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- 2 German Funding Programmes for Scientists and Researchers. – Deutscher Austauschdienst [DAAD]. - Brandt GmbH, Bonn. – 2010. – 59p.
- 3 Research in Germany.– URL: <http://www.research-in-germany.de/funding>
- 4 DAAD Funding Database. – URL: <http://www.funding-guide.de/>
- 5 Alexander-von-Humboldt Stiftung for experienced researchers. — URL: <http://www.humboldt-foundation.de/>

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## НАУКА И ОБРАЗОВАНИЕ В ГЕРМАНИИ:

### СИСТЕМА ПОСТДОКТОРАНТУРА

#### Резюме

Краткий обзор знакомит читателя с общей концепцией постдокторантуры. Постдокторантура определена как следующий этап для повышения квалификации научного работника, который ставит целью занять должность профессора в одном из немецких университетов. Перечислены квалификационные требования и условия работы на постдокторской позиции. В частности, подробно представлены ее особенности в германской системе науки и образования. Материал основан на опыте работы автора в университетах Западной Европы в качестве постдокторанта.

**Ключевые слова:** постдокторантура, зарубежное образование, послевузовское образование, повышение квалификации, докторантура, наука в Германии, международное сотрудничество.

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# ГЕРМАНИЯДАҒЫ ҒЫЛЫМ МЕН БІЛІМ БЕРУ: ДОКТОРАНТУРАДАН КЕЙІНГІ ЖҮЙЕ

## Резюме

Қысқаша шолу оқырмандарды докторантурадан кейінгі жалпы тұғырындамамен таныстырады. Докторантурадан кейінгілік неміс университеттерінің бірінде профессор лауазымын иеленуді мақсат еткен ғылыми қызметкер біліктілігін көтерудегі келесі кезең екендігі айқындалған. Докторантурадан кейінгі тұсындағы жұмыстың жағдайы және оған біліктілік тұрғыда қойылатын талаптар келтірілген. Дәлірек айтқанда, оның ғылым мен білімнің германдық жүйесіндегі ерекшеліктері жан-жақты баяндалады. Материал автордың батыс Еуропа университеттерінде постдокторант болып кезіндегі іс-тәжірибесіне негізделген.

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