

AP14869933 “Developing an innovative model "Statistical analysis and information processing for scientific research for distance education” – p.m. Abayeva N.F.

Relevance: the idea of this project is to develop a massive online open course "Statistical analyzing and processing information for scientific research" for distance education of young researchers who face the global problem when it is necessary to conduct statistical analysis and to process the obtained research results.

Project objective: to develop the innovative model "Statistical analyzing and processing information for scientific research" for distance education.

Achieved results

The MOOC "Statistical analyzing and processing information for scientific research" was developed for distance education on the platform of Abylkas Saginov Karaganda Technical University NJSC in Kazakh and English, Certificate No. 9591 dated 05/17/2024, Certificate No. 9590 dated 05/17/2024. The MOOC "Statistical analyzing and processing information for scientific research" was implemented at Karaganda University of Kazpotrebsoyuz (Karaganda) and at Alkey Margulan Pavlodar Pedagogical University (Pavlodar). The implementation results were published in articles in the journals included in the Scopus database: two publications in international peer-reviewed journals: Cogent Education, 2024, 11(1) (CiteScore 2023 2.3; ASJC Category - Education; Percentile 53); Asian Journal of University Education Vol. 20, Issue 3, October 2024 (CiteScore 2023 4.3; ASJC Category - Education; Percentile 77).

Results of work for 2022-2024

The developed and implemented online course "Statistical analyzing and processing information for scientific research" will be a desirable means of achieving the objective when working on scientific research. It will facilitate the work of young researchers, and will also allow raising the quality of scientific research to a new level, in which statistical methods of information processing will be used. The results of implementation showed that 12.1% more students who studied the MOOC received a high assessment of their scientific work. The average assessment was 14.1% higher for students in the experimental group, and a low assessment was for students who did not study the MOOC "Statistical analyzing and processing information for scientific research". According to the plan for 2022 – 2024, the work was fully completed, in some areas overfulfilled. All the planned results were obtained, the content of the publications corresponds to the objective and goals of the study. The objective of the project "Statistical analyzing and processing information for scientific research" was achieved. The MOOC "Statistical analyzing and processing information for scientific research" was developed in three languages.

Within the period of carrying out works at the project, there were published the following articles:

1) Abayeva Nella, Zhurov Vitaly, Mustafina Lezzetzhan, Smirnova Galina, Abayev Rafkat. The role of mathematical knowledge development of higher education students in the formation of critical and analytical thinking. University proceedings, No. 4(89), 2022. P. 332-339. DOI 10.52209/1609-1825_2022_4_332

2) Abayeva Nella, Zhurov Vitaly, Abayev Rafkat. Theoretical and Methodological Foundations for the Professional Orientation of Mathematics. University Proceedings. No. 3(92), 2023. P. 298-303, DOI 10.52209/1609-1825_2023_3_298

3) Abayeva Nella, Zhurov Vitaly Development of the online course Statistical analyzing and processing information for research work. University Proceedings. No. 2 (95), 2024, C. 333-338, DOI 10.52209/1609-1825_2024_2_333

4) Abayeva, N., Zhurov, V., Mustafina, L. (2024). Innovative massive open online course for young researchers: impact of implementation at Kazakhstan universities. Cogent Education, 11(1). <https://doi.org/10.1080/2331186X.2024.2378269> (Scopus:

<https://www.scopus.com/sourceid/21100843893>, Web of science: <https://www.webofscience.com/wos/woscc/full-record/WOS:001271702600001>)

5) Abayeva, N., Zhurov, V., Mustafina, L., Yerakhtina I., Mustafina B. Leveraging Mathematics to Enhance Critical Thinking in Technical Universities. Asian Journal of University

There have been received the following certificates for the MOOC:



Figure 1 – MOOC certificates No. 9021, No. 9022 dated 04/09/2023



Figure 2 – MOOC certificates No. 9590, No. 9591 dated 17/05/24

To test the educational model "Statistical analyzing and processing information for scientific research" at the universities of the Republic of Kazakhstan, Certificates of state registration of rights to a copyright object were received:

1. No. 30561 dated November 23, 2022, Abayeva N.F. "Elements of Probability Theory and Mathematical Statistics";

2. No. 30556 dated November 23, 2022, Mustafina L.M., "Statistical Estimates of Distribution Parameters";

3. No. 33240 dated March 3, 2023, Abayeva N.F. "Mathematical Statistics. Part 1. Sampling Method";

4. No. 36578 dated June 2, 2023, Yarullina A.R. "Elements of Mathematical Statistics. Sampling Method";

5. No. 40349 dated November 9, 2023, Abayeva N.F. "MOOC "Statistical Analyzing and Processing Information for Research Work": Possibilities, Implementation";

6. No. 44067 dated March 29, 2024, Abayeva N.F. "Elements of Mathematical Modeling";

7. No. 46280 dated May 23, 2024, Mustafina L.M., Zhurov V.V., Yarullina A.R. "Elements of Probability Theory. Basic Concepts of Theory";

8. No. 48616 dated July 25, 2024, Abayeva N.F. "A Novel Refined Massive Open Online Course for Young Researchers: The Effects of Implementation at Kazakhstan Universities".

A monograph approved by the Academic Council was published, Minutes No. 11 dated 04/26/23: N.F. Abayeva, V.V. Zhurov. Formation of mathematical competencies for the development of scientific research works at universities. Karaganda, Abylkas Saginov KTU, 2023, 188 p.

In addition to the plan, a textbook approved by the Academic Council, Minutes No. 11 of 06/07/24 was published Elements of Mathematical Statistics: N.F. Abayeva, V.V. Zhurov, A.R. Yarullina; Abylkas Saginov Karaganda Technical University NJSC. 2024. 164 p.

The following acts on the implementation of MOOCs in the educational process of the universities of the Republic of Kazakhstan were received:

1) Act dated 07/11/2023. K. Sagadiyev University of International Business, Almaty (MOOC is implemented in the educational process for training bachelors of the State Educational Institution of Higher Professional Education ICT, for 2nd and 3rd year students);

2) Act dated 09/11/2023. Abylkas Saginov Karaganda Technical University, Karaganda (EPs: IT medicine, Information security systems, Logistics, Management, Evaluation, Radio engineering, electronics and telecommunications, Information systems, Machine learning and data analysis).

3) Implementation Act No. 03 dated 21/02/2024. Karaganda University of Kazpotrebsoyuz, Karaganda (EP: IS, course "Stochastic methods and models");

4) Implementation Act No. 04 dated 05/06/2024. Alkey Margulan Pavlodar Pedagogical University (EP: 6B01510 Mathematics, 6B01510 Mathematics-Physics).

As part of the implementation of grant AP14869933 "Developing the innovative model "Statistical analyzing and processing information for research" for distance education, project manager Nella Fuatovna Abayeva and responsible researcher Vitaly Vladimirovich Zhurov took business trips to Ural Federal University named after the first President of Russia B.N. Yeltsin (Yekaterinburg, Russia):

- in 2023. The meeting was held with Vice-Rector for International Relations of UrFU S.G. Tushin; an agreement was reached on joint work and signing an agreement between the Abylkas Saginov Karaganda Technical University NJSC and the Federal State Autonomous Educational Institution of Higher Education of Ural Federal University named after the first President of Russia B.N. Yeltsin;

- in 2024, they spoke at the meeting of the Methodological Council of the Institute of Fundamental Education (Minutes No. 7 dated 08/27/24) and presented a massive open online course on the MOODLE platform of Abylkas Saginov Karaganda Technical University NJSC. During the discussion of the MOOC "Statistical analyzing and processing information for

research", positive assessments were received from the faculty of the Department of Higher Mathematics of Ural Federal University.



Figure 3 – Visit to Ural Federal University named after the first President of Russia B.N. Yeltsin (meeting of the Methodological Council, Yekaterinburg, Russian Federation, August 2024)

To expand and to reach a large number of MOOC users, a business trip was made to the Bukhara Engineering and Technology Institute (Bukhara, Uzbekistan). At the meeting, dean of the Faculty of Distance Education R.B. Sabirov presented the MOOC "Statistical analyzing and processing information for research" developed within the framework of this project. During the presentation of the MOOC, positive feedback was received from teachers, master and doctoral students. The relevance of this educational product, its high potential and demand were noted. (Minutes No. 2 dated 03/10/24).



Figure 4 – Bukhara Technological University (meeting of the scientific and methodological seminar, Bukhara, Republic of Uzbekistan, October 2024)

Research team

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Information for potential consumers: The MOOC is located at edu.kstu.kz.

Scope: In research work for processing the obtained research results when completing diploma and dissertation papers.

Date of information updating: 08/11/2024.