AMERICAN JOURNAL OF SOCIAL AND HUMANITARIAN RESEARCH

ISSN: 2690-9626
Vol. 3, No. 11, 2022

Development of Professional Competence of Chemistry Teachers of Higher Education Institutions - Factor of Education Quality

N. Odilkhojazoda
Doctoral Student of the Ferghana State University

ABSTRACT: The article describes the methodology for diagnosing the professional competence of chemistry teachers working in higher educational institutions, based on current criteria and the results of determining its pedagogical effectiveness. The statistical analyzes carried out confirmed that the experimental work was carried out scientifically, pedagogically, technologically and methodically, and the diagnostic technique was effective.

KEYWORD: professional competence, development of professional competence, pedagogical efficiency, research methods, statistical analysis.

The rapid development is establishing more and more strict standards and requirements for the national education system and its quality. Keeping up with the demands of the times, training competitive personnel depends in many respects on the professional competence of professors and teachers working in higher educational institutions. After all, the quality of education is determined by the degree to which the professional competence of professors is developed.

A number of scientific results have been achieved in the world through research in the development of methods and ways of assessing professional competences. In particular, competence assessment methods (The University of Chicago), an integrative model of professional competence requiring a five-point assessment have been developed (University of Sheffield). Recognition of competences as a common goal and primary task is conceptually based at the level of European education (University of Tours), three-level competence indicators are defined and recommended for a better understanding of educational results (University of Twente) , two main approaches are based on the purpose of clarificationthe concept of "professional competence": the specific activity of a person and the formation of a person as a professional (LMSU, ETU “LETI”) [1].

At the same time, in accordance with modern educational trends, improving the methodology of determining the professional competence of chemistry teachers based on the competence approach is of urgent importance.

From the analysis of the literature on the subject and the dissertations completed in this regard, it became clear that although a great deal of research has been done to discover the problems of teaching chemistry in higher education institutions, the theoretical and methodological foundations of the system of forming the informational and methodological competence of chemistry teachers, the formation of professional competences in future chemistry teachers, interactive teaching of special chemical sciences, professional skills and qualifications was conducted by G.M.Chernobelskaya, G.Ya.Gulbis, B.P.Bolotinskaya,

ISSN 2690-9626 (online), Published by “Global Research Network LLC"
under Volume: 3 Issue: 11 in Nov-2022 https://grnjournals.us/index.php/AJSHR

Yu.Yu.Gavronskaya, O.V.Romanova, I.A.Adaev, G.M.Kortunov, E.V. Nechitailova and others, the issues of improving the methodology of determining the professional competence of a chemistry teacher were not sufficiently studied [3-5].

As a result of current research, a two-stage methodology for determining the professional competence of chemistry teachers working in higher education institutions was created and tested in practice.

1. A methodology for diagnosing the professional competence of chemistry teachers working in higher education institutions was developed. In this methodology, the criteria for determining the professional competence of chemistry teachers of higher education institutions covered the following 16 points. Including the followings:

- Knowledge of trends in the development of science and technology related to the field; Ability to apply knowledge related to the field in practice (maximum score 10)
- Knowledge of the requirements for teaching the subject of chemistry, the requirements specified in the State Education Standards (maximum score 7)
- To have an understanding of the amount of hours allocated to the field in the sample working study plans, their share among other educational subjects, to be able to make changes if necessary (maximum score 6)
- Knowledge of the methodology of chemistry teaching and educational work. Knowing the importance of education and educating the younger generation on this basis (maximum score 7)
- Knowledge of pedagogical foundations of general professional sciences, pedagogy, psychology, physiology of personal development (maximum score 5)
- Having the skills and qualifications to use chemistry experiments in teaching; showing signs of creativity (maximum score 7)
- Mastering the general and specific issues of teaching chemistry. Being able to apply acquired and mastered knowledge in one's professional activity (maximum score 7)
- Knowing the requirements for the equipment of chemistry classrooms and laboratories (maximum score 5)
- Ability to work with laboratory equipment (maximum score 6)
- Mastery of academic and methodological knowledge, high motivation (maximum score 6)
- The level of use of information and communication technologies (maximum score 6)
- The level of use of Internet resources (new information on the subject, etc.) in educational activities (lecture, laboratory, practical training and seminars) (maximum score 7)
- The need to develop professional competence for the teacher (maximum score 5)
- Level of knowledge of foreign languages (English, German) (maximum score 6)
- Knowledge of newly built, modernized large chemical production (plants, joint ventures) and chemical processes in Uzbekistan in 2017-2021 (maximum score 5)
- Environmental competence (maximum score 5)

2. A total of 100 test questions ongeneral professional subjects taught in higher education institutions in the field of chemistry bachelor's education (the analysis of the literature on the subject revealed that based on the world practice, inorganic, organic, physical, and analytical chemistry were taken as general professional subjects in chemistry), chemistry teaching methodology, pedagogy and pedagogical skills, competences, normative documents were developed, reviews were received from the leading specialists of the field on the quality, validity, level of difficulty, reliabilityand other criteriaof these tests.

ISSN 2690-9626 (online), Published by "Global Research Network LLC"
under Volume: 3 Issue: 11 in Nov-2022 https://grnjournals.us/index.php/AJSHR

According to this methodology, the professional competence of the chemistry teacher was determined on the basis of 4 levels based on the criterion of 100 points. Including the followings:

- 86-100 points , (grade5) K-**1 level-high,**
- 71-85 points, (grade 4) K-**2 level-good ,**
- 55-70 points, (grade 3) K-**3 level-satisfactory,**
- 1-54 points , (grade 2) K-**4 level-unsatisfactory**

In the 2019-2022 academic yearsa total of 408 respondents from Fergana, Namangan, Gulistan State Universities, Kokand State Pedagogical Institute, as well as regional centers for personnel qualification improvement and retraining of FSU and NUUzwere involved in the experimental work on determining the professional competence of chemistry teachers of higher education institutions.

A 10-hour course (6 hours of lectures, 4 hours of seminars) was created on the basis of the research conducted in our republic and abroad on the determination of the professional competence of a chemistry teacher and its development, the study of completed dissertations and the objective of the current research. Qualification requirements for chemistry teachers of higher education institutions, professional competence of chemistry teachers, foreign experience in this regard, methodology of determining professional competence of chemistry teachers, criteria and other issues were coveredin this course. Lessons based on this 10-hour course were held in the 2019-2022 academic years. The results of the preliminary survey and test of professors were analyzed, explanations and comments were given on the difficult questions, foreign experiences on the professional competence of the chemistry teachers, recommendations on the development of professional competence were given during the course.At the end of the course, professors and teachers were given questionnaires and tests.

The research work on the development of professional competences of teachers was carried out in a theoretical-experimental way during the course related to the field of research and included the following three stages:

the first stage - studying the literature related to the problems posed in the research, determining the purpose and hypotheses of the research, conducting recording experiments, developing the scientific-theoretical basis of the dissertation;

the second stage - conducting pilot studies on the basis of HEIs and regional centers for personnel qualification improvement and retraining;

the third stage - analysis of the obtained results, bringing them into one system and formalizing them in the form of a dissertation [6].

The methods used in the experimental work of the research: theoretical-logical analysis, comparison, questionnaire; interview, test samples, generalization of advanced innovative pedagogical experiences, observation; questionnaire-survey, mathematical-statistical methods.

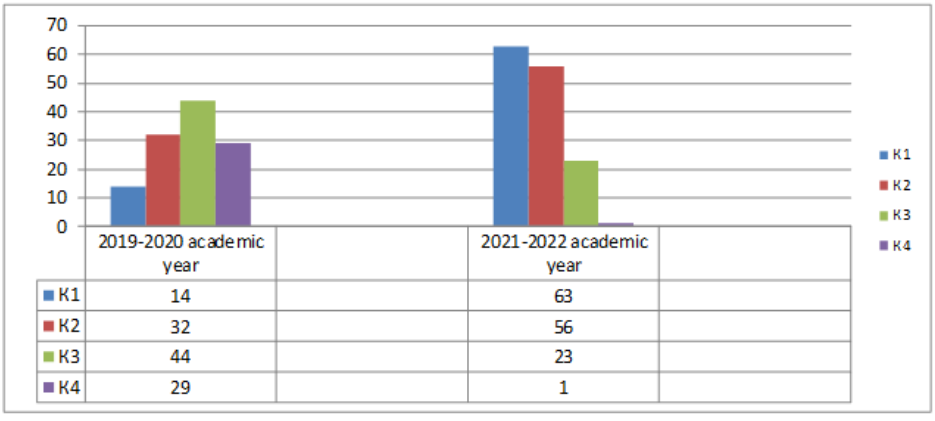
Based on the developed diagnostic methodology and teststhe levels of professional competence of 408 professors and teachers were determined during the pedagogical experiment in 2019-2022.

According to the analysis of the results of the experiment, it was found that the knowledge, skills and qualifications of the professors and teachers involved in the research process in the 2021-2022 academic year are effective compared to the professors and teachers of the 2019-2020 academic year. Statistical analysis was conducted to objectively evaluate this situation. The results showed that in the 2020-2021 academic year, the level of professional competence to be developed in chemistry teachers was 1.11 times higher than in the

ISSN 2690-9626 (online), Published by "Global Research Network LLC"
under Volume: 3 Issue: 11 in Nov-2022 https://grnjournals.us/index.php/AJSHR

2019-2020 academic year, and in the 2021-2022 academic year, it was 1.18 times higher than in the 2020-2021 academic year.

The following diagram shows a comparison of the average values of the experimental results.



	2019-2020 academic year		2021-2022 academic year	
K1	14		63	
K2	32		56	
K3	44		23	
K4	29		1	

Figure 1. Diagram of the diagnosis of chemistry teacher mastery degreebased on the developed diagnostic methodology

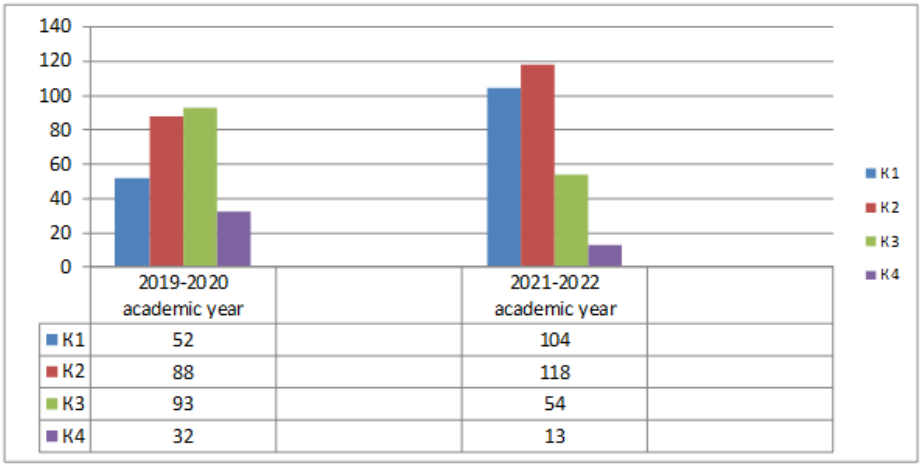
As can be seen from the diagram, indicators K_1 and K_2 arehigher than indicators K_3 and K_4.

The results showed that in the 2021-2022 academic year, the chemistry teacher achieved 1.15 times higher mastery compared to the 2019-2020 academic year.

The results of research, based on the methodology given aboveon the determination of the level of professional competence of chemistry teachers were analyzed using mathematical and statistical methods.

According to the analysis of the results of experimental work, the test results of the teachers involved in the research process in the 2021-2022 academic year were higher compared to the teachers of the 2019-2020 academic year in knowledge, skills and qualifications perspectives. Statistical analysis was performed to objectively evaluate this situation. The results showed that the level of professional competence of chemistry teachers, which should be developed on the basis of tests, was 1.12 times higher in the 2020-2021 academic year than in the 2019-2021 academic year, and 1.16 times higher in the 2021-2022 academic year than in the 2020-2021 academic year.

The following diagram was created comparing the average values of the experimental results.



	2019-2020 academic year		2021-2022 academic year	
K1	52		104	
K2	88		118	
K3	93		54	
K4	32		13	

Figure 2. Diagram of development professional competence of chemistry teachersbased on tests

ISSN 2690-9626 (online), Published by "Global Research Network LLC"
under Volume: 3 Issue: 11 in Nov-2022 https://grnjournals.us/index.php/AJSHR

The results showed that, based on the tests of the competence of the chemistry teachers, the efficiency indicators of the experimental work achieved an average of 1.14 times higher masteryin the 2021-2022 academic year compared to the 2019-2020 academic year.

The effectiveness of the methodology used in the experiment was confirmed during the research. At the end of the research, the level of professional competence of chemistry teachers that needed to be improved was observedin their ability to use the system of additional considerations, to express their thoughts clearly and thoughtfully, and to holdexperiments with the future chemistry teachers they were teachingin higher education institutions.

CONCLUSION

1. The methodology for determining the professional competence of chemistry teachers of higher educational institutions was developed, and its results were scientifically proven to be a guaranteed process.
2. In the experimental tests conducted in 2019-2022, the level of professional competence of chemistry teachers was determined.
3. The model of practical testing of the methodology for determining the professional competence of chemistry teachers was put into practice in the 2019-2022 academic years, and its level of effectiveness was analyzed.It was scientifically based on the means of creating a wide opportunity for the use offorms of technological organization of the process to improve the professional competence of the model chemistry teacher (online lecture, webinar, presentation lesson, online dialogue); new methods (demonstration, practical, interactive, dialogic, reflexive) and tools.
4. In order to develop the professional competence of a chemistry teacher, it is necessary to constantly update the knowledge, skills and qualifications of the field, to work on oneself, to improve the competence of self-development, to improve the level of perfect knowledge of information and communication technologies and foreign languages, to constantly monitor chemical production and the processes involved in them, it is required to strengthen the knowledge in this regard, to develop the environmental competence in terms of environmental protection, to fully master the skills of motivation, realization and reflection in education.

REFERENCES:

1. В.Хамидов, К.Сирожиддинов, Н.Умархонов, Қ.Исмоилов, Х.Турсунбоев, Х.Абдуллаев. “Электрон таълим мухитида касбий компетентликни такомиллаштириш”, Монография, Тошкент- 2018 йил.
2. Н.Б.Одилхўжазода. «Основные профессиональные компетенции преподавателей химии высших учебных заведений». International scientific and practical conference "Innovative development in the global science" Abstracts of VIII International Scientific and Practical Conference 5-part, 5-204 pages. https://academicsresearch.com/index.php/iditgs 28.09.2022. 205-210 бет.
3. Ю.Ю.Гавронская. “Интерактивное обучение химическим дисциплинам как средство формирования профессиональной компетентности студентов педагогических вузов”. Автореферат диссертации на соискание ученой степени доктора педагогических наук, Санкт-Петербург-2009.
4. О.В.Романова “Теоретические и методические основы системы формирования информационно-методической компетентности учители химии в педагогическом вуза”. Автореферат диссертации на соискание ученой степени кандидат педагогических наук, Ростов-на Дану-2007.

ISSN 2690-9626 (online), Published by “Global Research Network LLC"
under Volume: 3 Issue: 11 in Nov-2022 https://grnjournals.us/index.php/AJSHR

5. И.А.Адаев. “Формирование профессиональных компетенций будущих учителей химии с использованием информационных технологий”. Автореферат диссертации на соискание ученой степени кандидат педагогических наук, Россия-2015.
6. Одилхўжазода, Н. (2022). КИМЁ ЎҚИТУВЧИЛАРИ КАСБИЙ КОМПЕТЕНТЛИГИНИ АНИҚЛАШ БЎЙИЧА ЎТКАЗИЛГАН ТАДҚИҚОТЛАР САМАРАДОРЛИГИ. *IJTIMOIY FANLARDA INNOVASIYA ONLAYN ILMIY JURNALI*, *2*(10), 1-7.
7. Askarovich, M. S., Qizi, O. N. B., & Kizi, M. I. B. (2021). FORMATION OF PROFESSIONAL-PEDAGOGICAL COMPETENCES OF FUTURE TEACHERS OF CHEMISTRY. *Вестник науки и образования*, (6-3 (109)), 28-31.
8. Askarovich, M. S., Uljaevna, U. O., & Inomjohnovna, O. N. (2020). Applying case study-method in teaching chemistry. *Проблемы современной науки и образования*, (3 (148)), 62-64.
9. Begmurzayevich, D. B. (2022). BO ‘LAJAK BOSHLANG ‘ICH SINF O ‘QITUVCHILARIDA REFLEKSIV MADANIYATNI RIVOJLANTIRISHNING METODOLOGIK ASOSLARI. *INTEGRATION OF SCIENCE, EDUCATION AND PRACTICE. SCIENTIFIC-METHODICAL JOURNAL*, *3*(6), 154-160.
10. Shermukhammadov, B. (2022). Creativity of a Teacher in an Innovative Educational Environment. *Journal of Higher Education Theory and Practice*, *22*(12), 127.
11. Shuxratjon, M. S. A. S. M. (2022). BO ‘LAJAK MUTAXASSISLARNING KASBIY KOMPETENTLIGINI RIVOJLANTIRISHNING METODOLOGIK ASOSLARI. *SCIENTIFIC APPROACH TO THE MODERN EDUCATION SYSTEM*, *1*(5), 177-180.
12. Sobirjon, A. (2020). SOCIO–PEDAGOGICAL FACTORS OF FORMATION OF ACTIVITIES OF SOCIETY AND SOCIAL INVOLVEMENT IN STUDENTS WHO HAVE AN ACTIVE LIFE POSITION. *European Journal of Research and Reflection in Educational Sciences Vol*, *8*(12).
13. Solievich, T. N. (2022). Specific aspects of improving the quality of education in higher education institutions. ACADEMICIA: An International Multidisciplinary Research Journal, 12(9), 31-34.
14. TEMIROV, N. (1992). QUESTIONMAKING WITHOUT QUESTIONNAIRE. SOTSIOLOGICHESKIE ISSLEDOVANIYA, (12), 104-105.
15. TEMIROV, N. (1995). SCHOOLCHILDREN OF UZBEKISTAN-THE IMAGE OF FAMILY. SOTSIOLOGICHESKIE ISSLEDOVANIYA, (7), 53-56.
16. Temirov, N. S. (1996). The school students of Uzbekistan: Image of the family. Russian Education & Society, 38(8), 80-89.
17. Temirov, N. S. (1997). The life values of rural school students in Uzbekistan. Russian Education & Society, 39(10), 21-31.
18. Tuychieva, I. (2015). The concept of pedagogical innovation in modern education. *The Advanced Science Journal*, 87-90.
19. Tuychieva, I., Aripov, S., Madaminova, D., & Mustaev, R. (2021). THE PEDAGOGICAL SYSTEM OF PREPARING BOYS FOR FAMILY RELATIONSHIPS IN GENERAL SECONDARY SCHOOLS. *湖南大学学报 (自然科学版)*, *48*(8).
20. Tuychiyeva, I. I. (2017). Question of Using Linguo-cultural Material for Learning Native Tongue in Professional Colleges. *Eastern European Scientific Journal*, (4), 84-88.

ISSN 2690-9626 (online), Published by “Global Research Network LLC"
under Volume: 3 Issue: 11 in Nov-2022 https://grnjournals.us/index.php/AJSHR

21. ugli Abdullaev, S. S. (2021). SOCIAL INVOLVEMENT IN STUDENTS RESULTS OF EXPERIMENTAL WORK ON THE DEVELOPMENT OF VIRTUES.

22. ugli Abdullaev, S. S. (2021, July). SOCIO-POLITICAL FACTORS OF DEVELOPMENT OF SOCIAL RELATIONSHIPS IN STUDENTS IN THE PROCESS OF PEDAGOGICAL EDUCATION. In *Euro-Asia Conferences* (pp. 168-170).

23. Urinova, N. M., & Abdullaeva, N. (2021). Opportunities to use project-based teaching technology in the development of students' research competence. *ACADEMICIA: An International Multidisciplinary Research Journal*, *11*(3), 2344-2348.

24. Urinova, N., & Abdullaeva, N. (2020). Opportunities for formulating research skills for higher education students. *Молодой ученый*, (11), 193-195.

25. Yusufovich, A. A. (2020). ISSUES OF FORMATION OF COMMUNICATIVE COMPETENCE, WHICH IS AN INTEGRAL PART OF PROFESSIONAL-PEDAGOGICAL TRAINING OF FUTURE TEACHERS IN THE EDUCATIONAL PROCESS. *European Journal of Research and Reflection in Educational Sciences Vol*, *8*(7).

26. Ахмедов, Б. А. (2020). Сиддиков Бахтиёр Саидкулович, Джалалов Бахромжон Бегмурзаевич МОДЕРНИЗАЦИЯ ОБРАЗОВАНИЯ-ОСНОВНОЙ ФАКТОР В ФОРМИРОВАНИИ ИННОВАЦИОННОЙ КОМПЕТЕНЦИИ БУДУЩИХ УЧИТЕЛЕЙ. *Academy*, *9*, 60.

27. Ахмедов, Б. А., Сиддиков, Б. С., & Джалалов, Б. Б. (2020). МОДЕРНИЗАЦИЯ ОБРАЗОВАНИЯ-ОСНОВНОЙ ФАКТОР В ФОРМИРОВАНИИ ИННОВАЦИОННОЙ КОМПЕТЕНЦИИ БУДУЩИХ УЧИТЕЛЕЙ. *Academy*, (9 (60)), 20-22.

28. Джалалов, Б. Б. (2018). РАЗВИТИЕ ПРОФЕССИОНАЛЬНОЙ КОМПЕТЕНТНОСТИ ПЕДАГОГИЧЕСКИХ КАДРОВ В УСЛОВИЯХ ГЛОБАЛИЗАЦИИ КАК ПЕДАГОГИЧЕСКАЯ ПРОБЛЕМА. In *INTERNATIONAL SCIENTIFIC REVIEW OF THE PROBLEMS AND PROSPECTS OF MODERN SCIENCE AND EDUCATION* (pp. 53-55).

29. Джалалов, Б. Б. (2019). ВАЖНЫЕ АСПЕКТЫ ФОРМИРОВАНИЯ ИННОВАЦИОННЫХ КОМПЕТЕНЦИЙ У БУДУЩИХ УЧИТЕЛЕЙ. In *EUROPEAN RESEARCH: INNOVATION IN SCIENCE, EDUCATION AND TECHNOLOGY* (pp. 43-44).

30. Джалалов, Б. Б. (2022). BO 'LAJAK O 'QITUVCHILARNING INNOVATSION KOMPETENTLIGINI SHAKLLANTIRISHDA SMART-TA'LIMNING IMKONIYATLARI. *УЧИТЕЛЬ*, *3*(4).

31. Мамажонов, Ш. А., & Кизи, О. Н. Б. (2019). Формирование профессиональной компетенции преподавателя химии. *Вестник науки и образования*, (19-2 (73)), 31-33.

32. Мамажонов, Ш. А., & Одилхўжазода, Н. Б. (2021). Бўлажак кимѐ ўқитувчиларининг компетентлигини шакллантириш технологиялари ва мезонлари. *НамДУ илмий ахборотномаси*, 437-438.

33. Одилхўжазода, Н. (2022). ОЛИЙ ТАЪЛИМ МУАССАСАЛАРИ КИМЁ ЎҚИТУВЧИЛАРИ КАСБИЙ КОМПЕТЕНТЛИГИНИ АНИҚЛАШ БЎЙИЧА ЎТКАЗИЛГАН ТАДҚИҚОТЛАРНИ САМАРАДОРЛИК КЎРСАТКИЧЛАРИ. *TA'LIM VA RIVOJLANISH TAHLILI ONLAYN ILMIY JURNALI*, *2*(10), 6-12.

ISSN 2690-9626 (online), Published by "Global Research Network LLC"
under Volume: 3 Issue: 11 in Nov-2022 https://grnjournals.us/index.php/AJSHR

34. Темиров, Н. С., & Наркабилова, Г. П. (2021). Проблема культуры общения, коммуникативности и социально-коммуникативной деятельности обучающихся в государственной образовательной политике. In традиции и инновации в национальных системах образования (pp. 563-567).

35. Уринова, Н. М., & Хусеинова, С. Б. (2021). Теоретико-практическая подготовка будущих учителей гуманитарного профиля к социально ориентированной воспитательной работе. *Бюллетень науки и практики*, *7*(5), 434-440.

36. Шермухаммадов, Б. (2012). Использование различных методов, форм и средств в воспитании молодежи. *Актуальные проблемы современной науки*, (5), 80-83.

ISSN 2690-9626 (online), Published by "Global Research Network LLC"
under Volume: 3 Issue: 11 in Nov-2022 https://grnjournals.us/index.php/AJSHR