The American Journal of Applied sciences
(ISSN – 2689-0992)
Published: May 31, 2021 | **Pages:** 103-115
Doi: https://doi.org/10.37547/tajas/Volume03Issue05-17

IMPACT FACTOR
2021: 5. 634

OCLC - 1121105553

Some Problems In The Use Of Reservoirs And Their Solutions (An Example Is The Todakol Reservoir)

Yo.Q. Hayitov
Bukhara State University, Uzbekistan

I.A. Ramazonova
Bukhara State University, Uzbekistan

M.O. Rajabova
Bukhara State University, Uzbekistan

ABSTRACT

The article discusses the issues of efficient use of the Todakol Reservoir to irrigate arable land in irrigated agriculture. The problems of the reservoir and their scientific solutions are discussed.

KEYWORDS

Reservoirs, Todakol, water volume, water area, energy, fisheries, irrigated agriculture, Amu-Bukhara canal, pool, turbidity, flow, hydrochemical analysis.

INTRODUCTION

It is no secret that water resources are limited around the world and in Central Asia, including Uzbekistan. The management of the hydrological regime of rivers plays an important role in the use of water resources. Reservoirs will be built to use river water wisely and not waste it.

At present, 53 reservoirs have been built in Uzbekistan, which are used in various sectors of the economy and agriculture.

They have a total volume of 18.8 km3 and a useful volume of 14.8 km3. The largest reservoirs are Tuyamoyin, Charvak, Todakol

The American Journal of Applied sciences
(ISSN – 2689-0992)
Published: May 31, 2021 | **Pages:** 103-115
Doi: https://doi.org/10.37547/tajas/Volume03Issue05-17

IMPACT FACTOR
2021: 5. 634
OCLC - 1121105553

and Kattakurgan. These reservoirs are used in a complex way, as mentioned above.

They are mainly used for irrigation, energy and industrial purposes. The study of the natural geographical conditions and hydrological properties of reservoirs, their effective use is a requirement of the time and is one of the urgent problems.

Purpose: We set ourselves the goal of studying the hydrological regime of reservoirs and their effective use in the future, as well as geographical forecasting.

The following tasks were performed to achieve the goal:

- Study the geographical location of the world's largest reservoir;
- Analysis of morphometric parameters of the reservoir;
- Assessment of hydro-ecological features of Todakol reservoir;
- Carrying out water measurements at the object of study;
- Assessment of the impact of the reservoir on the environment;
- Observation of the impact of the Todakol reservoir on the dynamics of groundwater;

Geographical forecasting of positive and negative processes of reservoirs. Depending on the geographical location of the world's reservoirs can be divided into large, medium and small reservoirs. Many years of research by experts in this field have revealed the hydrological properties of reservoirs and their morphometric parameters.

Some information about the largest reservoirs in the world
Table 1

Reservoir	Country	River, lake	Water volume, km^3	Water volume
Viktoriya	Tanzaniya Keniya Uganda	Neil and Victoria	205	1968
Kuybishev	Rossiya	Volga	58	1957
Volgograd	Rossiya	Volga	33,5	1962
Kanevsk	Ukraina	Dnepr	28	1963
Daniel Jonson	Kanada	Manikuagan	142	1968
Garrison	AQSH	Missuri	30,6	1954
El Mantek	Venesuela	Karoni	111	1968

(Ko'lshunoslik. F.H. Hikmatov D.P.Ayitboyev.Toshkent-2002)

The American Journal of Applied sciences
(ISSN – 2689-0992)
Published: May 31, 2021 | **Pages:** 103-115
Doi: https://doi.org/10.37547/tajas/Volume03Issue05-17

IMPACT FACTOR
2021: 5. 634
OCLC - 1121105553

The table shows that one of the largest reservoirs in the world was built on the Victoria-Nile River and is located in Kenya, Uganda and Tanzania. Its water capacity is 205 km3. It is designed to control the flow of the Nile over the years. The Kuibyshev Reservoir was built in Russia in 1957 on the Volga River and has a volume of 58 km3. Another large Russian reservoir is the Volgograd, which was completed in 1962 on the Volga River and has an average volume of 33.5 km3.

The Kanevsk Reservoir, built on the Dnieper River, is also large. The reservoir has been supplying 28 km3 of water a year to Ukraine since 1963. One of the largest reservoirs in the Americas, the Daniel Johnson Reservoir was opened in 1968 on the Manaikuagan River in Canada.

One of the largest reservoirs in the United States is the Garrison Reservoir. It was drawn from the Missouri River and replenished in 1954. The total volume of water is 30.6 km3. Another major reservoir is the El Mantec Reservoir in Venezuela, which was commissioned in 1968 on the Caroni River and has a volume of 111 km3.

In particular, according to historical data, the construction of small reservoirs and pools in Central Asia began at the end of the old era and the beginning of the new era. In countries such as Turkmenistan, Uzbekistan, Kyrgyzstan and Kazakhstan, water redistribution is underway. The Republic of Uzbekistan is one of the leaders in this field, and today the country has large irrigation systems. There are more than 17,000 natural streams in the country. In the Amudarya basin they are 9.9, in the Syrdarya basin 4.9, and the interval between these rivers is 2.9 thousand, but the bulk of them are small streams with small streams not exceeding 10 km. This is especially true between the Amudarya and Syrdarya rivers.

Large reservoirs in Uzbekistan are used for a variety of industries, so long-term use of reservoirs and changes in their operation can lead to sharp blurring. According to the data, 11 reservoirs need to be cleaned of mud, and 5 reservoirs have reached the limit of water outflow. (National Report on the state of the environment and use of natural resources in the Republic of Uzbekistan Tashkent. 2008-2011).

Information on some reservoirs in Uzbekistan

Table 2

Reservoir	Country	River, lake	Water volume km^3	Water volume
Tuyamo'yun	Amudaryo	1979	7300	790,0
Chorbog'	Chirchiq	1978	2000	40,3

The American Journal of Applied sciences
(ISSN – 2689-0992)
Published: May 31, 2021 | **Pages:** 103-115
Doi: https://doi.org/10.37547/tajas/Volume03Issue05-17

IMPACT FACTOR
2021: 5. 634
OCLC - 1121105553

Andijon	Qoradaryo	1970	1750	60,0
Tollimarjon	Amudaryo	1977	1530	77,4
To’dako’l	Zarafshon	1983	875	225,0
Kattaqo'rg'on	Zarafshon	1952	845	83,6
Janubiy Surxon	Surxondaryo	1964	800	65,0
Chimqo’rg’on	Qashqadaryo	1964	440	45,1
Ohangaron	Ohangaron	1974	339	8,1
Quyimazor	Zarafshon	1957	306	16,3
Pachkamar	G’uzordaryo	1967	243	12,4
Karkidon	Quvasoy	1964	218	9,5
Tuyabo’g’iz	Ohangaron	1964	204	20,7
Hisorak	G’uzordaryo	1985	170	4,1
Sho’rko’l	Zarafshon	1983	170	17,0
Uchqizil	Surxondaryo	1960	160	10,0
Kosonsoy	Kosonsoy	1954	160	7,6
Jizzax	Sangzor	1962	73,5	12,5
Uchqo’rg’on	Norin	1961	54,0	3,7
Xojikent	Chirchiq	1977	30,0	2,5
Qamashi	Qashqadaryo	1946	25,0	3,4

(Gidrologiya asoslari 2003y. A.R.Rasulov, F.H.Hikmatov, D.P.Ayitboyev)

To date, many reservoirs have been completed. One of the largest reservoirs in Uzbekistan is Todakol. That's why we did research at the Todakol Reservoir. In the process of research, we analyze the geographical conditions of the reservoir, the hydrological regime.

The American Journal of Applied sciences
(ISSN – 2689-0992)
Published: May 31, 2021 | **Pages:** 103-115
Doi: https://doi.org/10.37547/tajas/Volume03Issue05-17

IMPACT FACTOR
2021: 5. 634
OCLC - 1121105553

Figure 1. Aerial view of the Todakol Reservoir

Figure 1 is a space image of the Todakol Reservoir. It describes the exact shape of the reservoir, the area around it and the geographical location. The geographical location of the reservoir is 390511 north latitude and 640 511 east longitude. The reservoir will be filled with water through the Amu-Bukhara canal. The natural geographical location of the dam is located in the Lower Zarafshan natural geographical district, east of the ancient Bukhara delta. Different sources (1952, 1968, 1973, 1983) give different information about the initial commissioning of the reservoir. The Zarafshan valley is located in the central part of Central Asia between Turkestan, Aktau and Zarafshan ridges. The eastern mountainous part of the valley belongs to Tajikistan, the western foothills and plains to the territory of Uzbekistan. The second stage of the Amu-Bukhara machine canal, which was put into operation in 1973, consisted of a sandy pond.

Todakol was established in 1983 to replace the erosion depression. The reservoir was built mainly to supply water to the irrigated lands of Bukhara and Navoi regions. Here are some of the ones I found to be interesting:

- Area 225 km2;
- Water capacity 1 billion m3;
- Average depth 3.9 meters,
- Water discharge capacity is 46 m3 / s.

The distance from the reservoir to Bukhara is 35 km.

The American Journal of Applied sciences
(ISSN – 2689-0992)
Published: May 31, 2021 | **Pages:** 103-115
Doi: https://doi.org/10.37547/tajas/Volume03Issue05-17

IMPACT FACTOR
2021: 5. 634
OCLC - 1121105553

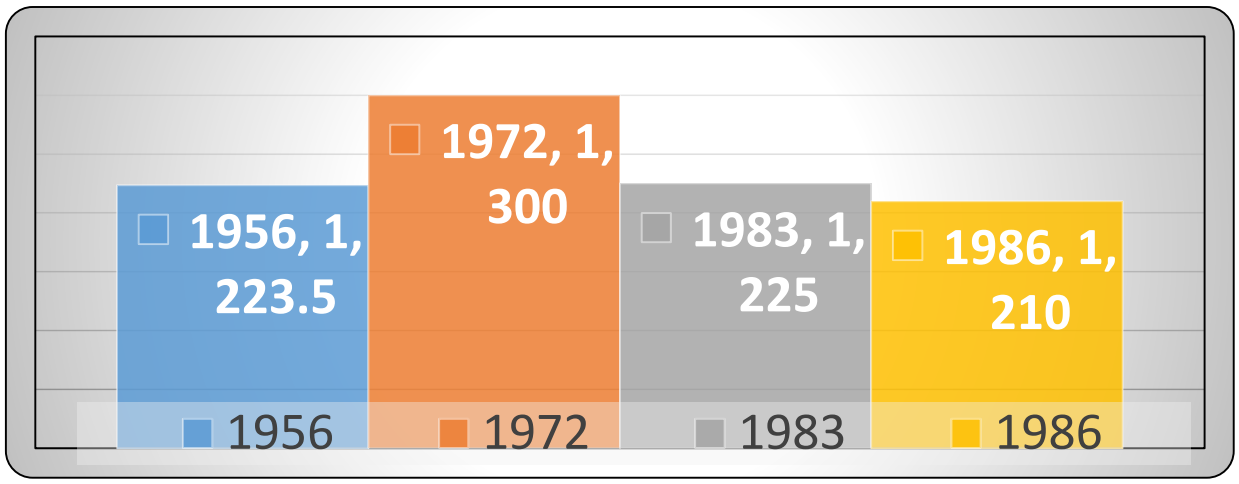

Figure 2. The area of the Todakol Reservoir has changed over the years

We compared the reservoir capacity, area, and average depth over different years. Figure 2 shows how the area of the reservoir has changed over the years. In 1956, the area of the reservoir was 223.5 km^2, in 1972 - 300 km^2, in 1983 - 225 km^2, and in 1986 - 210 km^2. This shows that the area of the reservoir changes frequently. This is due to the demand of the population for water and the amount of water produced in the rivers.

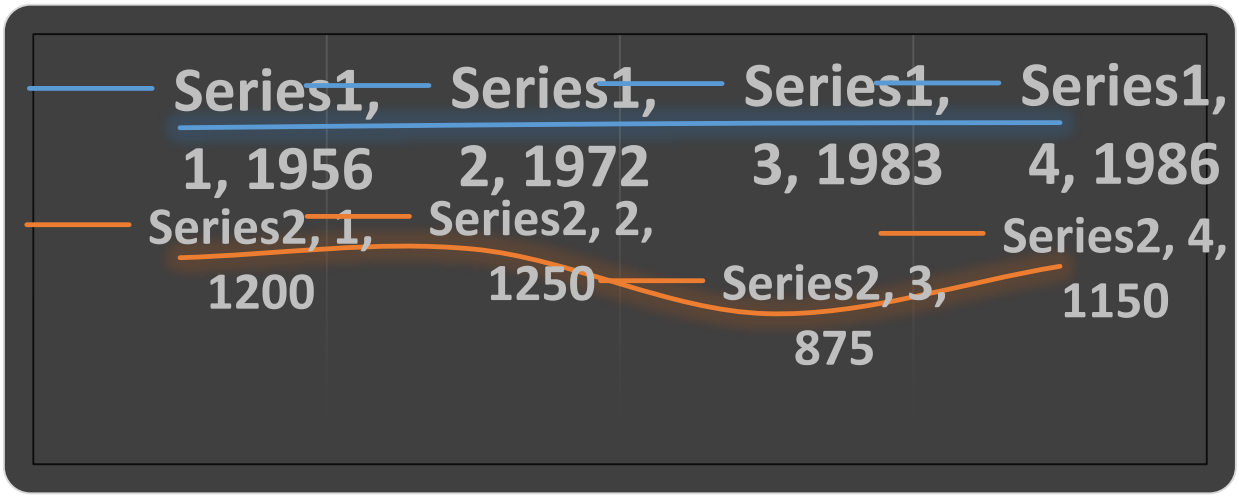

Figure 3. The volume of water in the Todakol Reservoir fluctuates over the years

Figure 3 shows the water capacity of the reservoir over the years. In 1956 it was 1,200 million m^3, in 1972 1,250 million m^3, in 1983 875 million m^3, and in 1986 1,150 million m^3. Even today, the reservoir is used efficiently.

The American Journal of Applied sciences
(ISSN – 2689-0992)
Published: May 31, 2021 | **Pages:** 103-115
Doi: https://doi.org/10.37547/tajas/Volume03Issue05-17

IMPACT FACTOR
2021: 5. 634
OCLC - 1121105553

Figure 4. General view of the Todakol Reservoir

Figure 5. Sandy landscapes

Today, the impact of the reservoir on the environment is growing. New small lakes have sprung up around the Todakol Reservoir, which has affected the dynamics of groundwater and created new lakes. A

The American Journal of Applied sciences
(ISSN – 2689-0992)
Published: May 31, 2021 | **Pages:** 103-115
Doi: https://doi.org/10.37547/tajas/Volume03Issue05-17

IMPACT FACTOR
2021: 5. 634
OCLC - 1121105553

large area around the road near the lake is covered with salt.

Figure 6. Lakes formed as a result of rising groundwater levels.

The American Journal of Applied sciences
(ISSN – 2689-0992)
Published: May 31, 2021 | **Pages:** 103-115
Doi: https://doi.org/10.37547/tajas/Volume03Issue05-17

IMPACT FACTOR
2021: 5. 634
OCLC - 1121105553

In recent years, due to the periodic filling of the Todakol reservoir, along with evaporation from the surface of the water, there is also absorption. As a result, the filtered water is added to the groundwater. As a result, groundwater expands and rises to form lakes of various sizes.

Figure 7. Of water in the chemistry laboratory of our university study of hydrochemical composition

As a result of our research in the reservoir, we took water samples and re-tested them. Two chemical elements, treilonb and black erythromycin, were added to the water of the Todakol reservoir to determine its hardness in the chemistry laboratory of our University. The hardness of water has been proven to be an average hardness of 5.5-6 g / ml.

The American Journal of Applied sciences
(ISSN – 2689-0992)
Published: May 31, 2021 | **Pages:** 103-115
Doi: https://doi.org/10.37547/tajas/Volume03Issue05-17

IMPACT FACTOR
2021: 5. 634
OCLC - 1121105553

Figure 8. Todakol Dam Reservoir. Prakopt waterworks

Prakopt waterworks.

The Prokopt waterworks was built in 1980 on the PK-1990 of the ABK II turn canal, which serves to provide sufficient water to the Kyzyltepa and Kyzyltepa-2 auxiliary pumping stations. When there is not enough water in the ABK canal for the normal operation of the pumping units, water is supplied through the Todakol outlet canal of the Prokopt waterworks. The Prokopt waterworks has 12 gates (4000mm * 5000mm) with 4 gates in the ABK canal and 4 gates in the canal from the Todakol water basin. The gates installed in the next canal ABK-2 discharge 150 m3 / sec of water. This water facility also plays an important role in the efficient use of water resources.

CONCLUSION

Today, some of the reservoirs are used simultaneously for agricultural, fishing, industrial and energy purposes. However, reservoirs have their own problems that need to be addressed, and life itself requires a positive approach based on science. Therefore, in order to use reservoir water efficiently, we need to pay attention to the following.

1. Organization of reservoir design on a scientific basis.
2. Development of measures for practical long-term use of reservoirs.
3. Preservation of reservoirs protection zone.
4. From the ecogeographic point of view – a sharp reduction in the impact of reservoirs on the environment.
5. Take the necessary measures to reduce the rapid turbidity process that may occur.
6. Regular monitoring of water level dynamics in reservoirs.
7. Organize the use of reservoirs in various sectors of the economy, including agriculture, on the basis of strict limits.
8. Positive solution of the problem of personnel in the effective management of the hydrological regime of reservoirs.

9. Establish regular reservoir monitoring

REFERENCES

1. Toshbekov Nurbek Ahmadovich, HayitovYozil Kasimovich, Jumaeva Tozagul Azamovna. EFFICIENT USE OF WATER RESOURCES OF THE AMU-BUKHARA CANAL. ACADEMIK. An International multidisciplinary Research Journal 30.05.2020.15-18
2. Водохранилища чрезвычайные ситуации и проблемы устойчмвости Ташкент-2004.УзНУ 5-7b.
3. O'zbekiston Respublikasida atrof – muhit holati va tabiiy resurslardan foydalanish to'grisidagi Milliy Ma'ruza Toshkent – 2008.
4. Hayitov Yozil Qosimovich, Toshbekov Nurbek Ahmadovich, Elmonov Maruf Tuyg'unovich. Buxoro viloyatidagi cho'llanishga bog'liq ayrim mummolar va ularning yechimlari. Urganch 2020.
5. GEOGRAFIYA. UZ .
6. TARIX.UZ
7. Тошбеков Нурбек Аҳмадович, Хамдамова Диловар Нуруллаевна, Хайитов Ёзил Косимович, Гидрологические основы использования дренажных сетей (по премире бухарской области). MONOGRAFIA POKONFERENCYJNA SCIENCE, RESEARCH, DEVELOPMENT #26 v. 2 Познань/Poznan 27.02.2020-28.02.2020 186-189.
8. Toshbekov Nurbek Ahmadovich, Hayitov Yo K., Jumaeva T. A, Hydrological Assessment Of The Meliorative Condition Of Collector Drink Water In Bukhara Region. Nature and Science. MARSLAND PRESS Volume 18 - Number 4 (Cumulated No. 157), April 25, 2020. 99-101.
9. Toshbekov Nurbek Ahmadovich, Hayitov Yozil Kosimovich, JumaeyaTozagul Azamovna, Nazarova Firuza Ahmedjanovna. The Formation of Water Collector-Resources Drainage Network of Zarafshan Oasisand the Questions of Recycling. TEST Engineering & Management. May-June 2020 ISSN: 0193-4120 Page No. 27380 – 2738.
10. Safoyeva Sadokat Nasilloyevna. SYNONYMY AND ITS FEATURES, 4th Global Congress on Contemporary Sciences & Advancements 30th April, 2021 Hosted online from Rome, Italy econferecegloble.com. P. 120-121, https://papers.econferenceglobe.com/index.php/ecg/article/view/400/397.
11. Kayumova Nigora Muxtorovna, Shukurova Nigora Shavkatovna, Safoeva Sadokat Nasilloevna. The Role of the Ethnographic Vocabulary in the English and Uzbek Languages, International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN; 2278-3075, Volume-8, Issue-9S3, July 2019, P. 1551-1554.
12. Набиева Зарина Набиевна, АСТРИД ЛИНДГРЕН АСАРЛАРИДА КИЧКИНТОЙЛАР РУҲИЯТИНИНГ БАДИИЙ ИФОДАСИДА ОБРАЗЛИЛИК. INNOVATION IN THE MODERN EDUCATION SYSTEM: a collection scientific works of the International scientific conference (25th May, 2021) – Washington, USA: "CESS", 2021. Part 6 – p.

13. Набиева Зарина, КИЧКИНТОЙЛАР РУҲИЯТИНИНГ БАДИИЙ ИФОДАСИДА ОБРАЗЛИЛИК. ПЕДАГОГИКА ВА ПСИХОЛОГИЯДА ИННОВАЦИЯЛАР ИННОВАЦИИ В ПЕДАГОГИКЕ И ПСИХОЛОГИИ INNOVATIONS IN PEDAGOGY AND PSYCHOLOGY №3 (2021) DOI http://dx.doi.org/10.26739/2181-9513-2021-3, Б. 62-67.
14. NabiyevaZ.N. The similarities and differences of proverbs with other genres
15. International journal of Psychosocial Rehabilitation, vol.24, Issue 06,2020 ISSN;1475-7192 mart
16. Nabiyeva Zarina Nabiyevna "Image In The Artistic Expression Of The Spirit Of Children" INTERNATIONAL JOURNAL ON ORANGE TECHNOLOGIES www.journalsresearchparks.org/index.php/IJOT e- ISSN: 2615-8140|p-ISSN: 2615-7071 Volume: 03 Issue: 03 | March 2021
17. NabiyevaZarinaNabiyevna** "STUDY OF FRENCH GASTRONOMIC CULTURE AND THE PROBLEMOF RECIPE TEXT"ACADEMICIA: An International Multidisciplinary Research Journal https://saarj.com
18. ISSN: 2249-7137 Vol. 10, Issue 11, November 2020 Impact Factor: SJIF 2020 = 7.13. DOI: 10.5958/2249-7137.2020.01631.6
19. Атоева М.Ф. Периодичность обучения физике. Аспирант и соискатель. Москва, 2010. – №6. – С. 41-43.
20. M.F. Atoyeva. Interdisciplinary relations in physics course at specialized secondary education. The Way of Science. – Volgograd, 2016. – №9 (31). – P.22-24.
21. M.F. Atoyeva. The significance of periodicity at teaching physics. The Way of Science. – Volgograd, 2016. – № 10 (32). – P.62-64.
22. Атоева М.Ф. Эффективность обучения электродинамике на основе технологии периодичности. The Way of Science. – Volgograd, 2016. – № 10 (32). – P.65-66.
23. M.F. Atoyeva. Use of Periodicity in Teaching Physics. Eastern European Scientific Journal. – Düsseldorf-Germany, 2017. № 4. –P. 35-39.
24. M.F. Atoyeva. Didactic foundations of inter-media relations in the training of university students. International Scientific Journal. Theoretical & Applied Science. p-ISSN: 2308-4944 (print) e-ISSN: 2409-0085 (online). Year: 2020 Issue: 06 Volume: 86, P. 124.
25. M.F. Atoyeva, R. Safarova. Pedagogical integration as a means of forming professionally important qualities among students of a medical university. Academicia. ISSN: 2249-7137 Vol. 10, Issue 8, August 2020. Impact Factor: SJIF 2020 = 7.13 ACADEMICIA: An International Multidisciplinary Research Journal https://saarj.comэ.
26. M.F. Atoyeva. Pedagogical Tests As An Element Of Types Of Pedagogical Technologies. The American Journal of Applied Sciences, 2(09), (TAJAS) SJIF-5.276 DOI-10.37547/tajas Volume 2 Issue 9, 19.09.2020. ISSN 2689-09. 92 The USA Journals, USA www.usajournalshub.com/index.php/tajas 164-169. Имп.5.2.
27. Farkhodovna, A. M. (2020). The problems of preparing students for the use of school physical experiment in the context of specialized education at

Published: May 31, 2021 | **Pages:** 103-115
Doi: https://doi.org/10.37547/tajas/Volume03Issue05-17
IMPACT FACTOR
2021: 5. 634
OCLC - 1121105553

secondary schools. European Journal of Research and Reflection in Educational Sciences, 8 (9), 164-167.

28. Saidov S.O., Fayzieva Kh. A., Yuldosheva N. B. Atoyeva M.F. The Elements Of Organization Of The Educational Process On The Basis Of New Pedagogical Technologies. The American Journal of Applied Sciences, 2(09), (TAJAS) SJIF-5.276 DOI-10.37547/tajas Volume 2 Issue 9, 19.09.2020. ISSN 2689-09.92 The USA Journals, USA www.usajournalshub.com/index.php/tajas 164- 169. Имп.5.2.

29. Atoeva Mehriniso Farhodovna, Arabov Jasur Olimboevich, Kobilov Bakhtiyor Badriddinovich. (2020). Innovative Pedogogical Technologies For Training The Course Of Physics. The American Journal of Interdisciplinary Innovations and Research, 2(12), 82-91.