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PEDAGOGICAL FORMATION OF STUDENTS' COGNITIVE ACTIVITY IN AN ADAPTIVE EDUCATIONAL ENVIRONMENT

Abstract. In modern education, the independent work of students is a necessary and important part of the educational process. Because it not only helps to consolidate the knowledge and skills acquired in practical courses but also contributes to the strengthening of cognitive activity. As a rule, one of the platforms for organizing independent work of students is an adaptive learning environment. The purpose of the study was to develop and implement a training course on the organization of independent work of students in an adaptive educational environment to increase the level of their cognitive activity. Research hypothesis: the level of cognitive activity of students increases when organizing independent work in an adaptive educational environment. By the purpose and hypothesis, the authors defined the objectives of the study: theoretical analysis of scientific literature, the study of the formation of cognitive activity of students, the study of the concepts of «pedagogical conditions» and «adaptive educational environment», diagnosis of the level of formation of cognitive activity of students; prepare students for independent work on the Moodle platform; analyze the results of the study. The proposed course included personalized adaptive learning. Second-year students of the specialty «Information Systems» of Aktobe Higher Polytechnic College in the course of mastering the subject «Mathematics» carry out training in this course. The statistics obtained indicate that the application of the developed training course in an adaptive personalized educational environment has a positive effect on increasing the level of cognitive activity of students. The data obtained by the authors can be used by teachers of other educational institutions in the process of forming the cognitive sphere of students.

Keywords: cognitive activity, students, pedagogical conditions, adaptive educational environment, independent work.

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***Бізге дұрыс сілтеме жасаңыз:**

Zhilmagambetova R.Z., Alimagambetova A.Z. Pedagogical Formation of Students' Cognitive Activity in an Adaptive Educational Environment // *Ясауи университетінің хабаршысы*. – 2022. – №3 (125). – Б. 246–255. <https://doi.org/10.47526/2022-3/2664-0686.21>

***Cite us correctly:**

Zhilmagambetova R.Z., Alimagambetova A.Z. Pedagogical Formation of Students' Cognitive Activity in an Adaptive Educational Environment // *Iasauı universitetinin habarshysy*. – 2022. – №3 (125). – Б. 246–255. <https://doi.org/10.47526/2022-3/2664-0686.21>

Адаптивті білім беру ортасында студенттердің танымдық белсенділігін педагогикалық қалыптастыру

Аңдатпа. Қазіргі білім беруде студенттердің өзіндік жұмысы оқу процесінің қажетті және маңызды бөлігі болып табылады. Себебі бұл практикалық курстарда алған білім мен дағдыларды нығайтуға ғана емес, сонымен қатар танымдық белсенділікті арттыруға көмектеседі. Әдетте, студенттердің өзіндік жұмысын ұйымдастыруға арналған платформалардың бірі ретінде бейімделген оқыту ортасын пайдаланған қолайлы. Зерттеудің мақсаты студенттердің танымдық белсенділік деңгейін арттыру үшін бейімделген білім беру ортасында өзіндік жұмысын ұйымдастыру бойынша оқу курсы әзірлеу және іске асыру болды. Зерттеу гипотезасы: оқушылардың танымдық белсенділік деңгейі бейімделген білім беру ортасында өзіндік жұмысты ұйымдастырған кезде жоғарылайды. Мақсаты мен гипотезасына сәйкес авторлар келесі зерттеудің міндеттерін анықтады: ғылыми әдебиеттерді теориялық талдау, студенттердің танымдық белсенділігінің қалыптасуын зерттеу, «педагогикалық жағдайлар» және «бейімделген білім беру ортасы» ұғымдарын зерттеу, студенттердің танымдық белсенділігінің қалыптасу деңгейін диагностикалау; студенттерді Moodle платформасында өз бетінше жұмыс істеуге дайындау; зерттеу нәтижелерін талдау. Ұсынылған курс дербес бейімделген оқытуды қамтыды. Осы курс бойынша оқытуды «Математика» пәнін игеру барысында Ақтөбе жоғары политехникалық колледжінің «Ақпараттық жүйелер» мамандығының екінші курс студенттері жүзеге асырады. Алынған статистика дамыған оқу курсы бейімделген дербес білім беру ортасында қолдану оқушылардың танымдық белсенділік деңгейінің жоғарылауына оң әсер ететіндігін көрсетеді. Авторлар алған мәліметтерді басқа оқу орындарының оқытушылары оқушылардың танымдық саласын қалыптастыру процесінде қолдана алады.

Кілт сөздер: танымдық белсенділік, студенттер, педагогикалық жағдайлар, бейімделген білім беру ортасы, өзіндік жұмыс.

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Педагогическое формирование познавательной активности студентов в адаптивной образовательной среде

Аннотация. В современном образовании самостоятельная работа студентов является необходимой и важной частью учебного процесса. Потому что это не только помогает закрепить знания и навыки, полученные на практических курсах, но и способствует усилению познавательной активности. Как правило, одной из платформ для организации самостоятельной работы студентов является адаптивная среда обучения. Цель исследования заключалась в разработке и реализации учебного курса по организации самостоятельной работы студентов в адаптивной образовательной среде для повышения уровня их познавательной активности. Гипотеза исследования: уровень познавательной активности учащихся повышается при организации самостоятельной работы в адаптивной образовательной среде. В соответствии с целью и гипотезой авторы определили задачи исследования: теоретический анализ научной литературы, изучение сформированности познавательной активности студентов, изучение понятий «педагогические условия» и «адаптивная образовательная среда», диагностика уровня сформированности познавательной

активности студентов; подготовить студентов для самостоятельной работы на платформе Moodle; анализировать результаты исследования. Предлагаемый курс включил в себя персонализированное адаптивное обучение. Обучение по данному курсу осуществляется студентами второго курса специальности «Информационные системы» Актюбинского Высшего политехнического колледжа в ходе освоения предмета «Математика». Полученная статистика свидетельствует о том, что применение разработанного учебного курса в адаптивной персонализированной образовательной среде положительно влияет на повышение уровня познавательной активности обучающихся. Данные, полученные авторами, могут быть использованы преподавателями других образовательных учреждений в процессе формирования познавательной сферы учащихся.

Ключевые слова: познавательная активность, студенты, педагогические условия, адаптивная образовательная среда, самостоятельная работа.

Introduction

In the modern socio-economic situation, the issues that form the cognitive activity of a student do not lose their relevance, as they are important in the new educational paradigm based on the independent work of students. The cognitive activity of students is one of the most important components of the educational process of secondary vocational education institutions, the formation of personal and professional qualities of future specialists largely depends on the cognitive activity of students. The effectiveness of the process of formation of cognitive activity of students largely depends on competently organized and independent work in the classroom. Currently, there are various resources for organizing students' independent work, but their impact on the formation of students' cognitive activity has not yet been fully studied. Therefore, it is necessary to study in detail the educational potential of the adaptive personalized educational environment, as well as the pedagogical techniques and methods implemented in it, in the formation of cognitive activity of students in the course of independent work. The authors consider the key characteristics of pedagogical methods and teaching methods aimed at the formation of adaptive educational environments, educational platforms, and cognitive activity of students. The materials of the article are part of the experimental work of the authors. The main purpose of the article is to analyze pedagogical experiments on the formation of cognitive activity of students in the conditions of organizing independent work in an adaptive educational environment. Research methods: literature analysis, questionnaires, statistical analysis. Second-year students of the specialty «Information Systems» of Aktobe Higher Polytechnic College attended the experiment. The experiment was organized as part of a lesson in the discipline «Mathematics».

Research methods

We have chosen such methods as questionnaires, testing, interviewing, self-diagnosis, task completion, and analysis of student activity products.

The methodological basis of the study

The theoretical part of the experiment includes the analysis of such concepts as «cognitive activity of students», «pedagogical conditions» and «adaptive educational environment». Let's consider these concepts in detail. Currently, there are many works in the field of pedagogy devoted to the study of some aspects of the development and formation of cognitive activities of students of various educational institutions. Among them, the works of K.B. Kabytkina [1], T.N. Bochkareva [2], and D.V. Gatsoev [3] should be noted. By analyzing these works, we conclude that the concept of «cognitive activity of a student» is a multifaceted and complex phenomenon. Cognitive activity with students is an activity to acquire knowledge, skills, and abilities in the fields of professional activity, combining personal–motivational, intellectual, and ambitious directions. Cognitive activity is an important factor determining the success of the educational process, as well as the professional

development of students. For the successful formation of the process of cognitive activity, teachers need to work on finding optimal pedagogical conditions.

By analyzing these works, we conclude that the concept of «cognitive activity of a student» is a multifaceted and complex phenomenon. Cognitive activity acts as a condition for the formation of students' need for knowledge, mastering the skills of intellectual activity, independence, and ensuring the depth and strength of knowledge. There is a contradiction in the educational process itself. On the one hand, it is a controlled pedagogical system and a process organized by the teacher, i.e., to some extent, a dictate on the part of the teacher as a teacher and organizer of the process. On the other hand, the teacher is faced with the task of developing students' cognitive activity, which also involves educational and operational, design and organizational independence. The teacher tries to bring students as close as possible to self-management of their cognitive activity for independent advancement in knowledge and, at the same time, must organize and manage the educational and cognitive process himself. We believe that the success of solving the problem of developing cognitive activity is largely determined by the position of the teacher, and his ability to apply innovative technologies in the learning process. Cognitive activity with students is an activity to acquire knowledge, skills, and abilities in the fields of professional activity, combining personal–motivational, intellectual, and ambitious directions. Cognitive activity is an important factor determining the success of the educational process, as well as the professional development of students. For the successful formation of the process of cognitive activity, teachers need to work on finding optimal pedagogical conditions.

The structure of pedagogical conditions invariably contains both internal elements that ensure the impact on the development of the personal sphere of the subjects of the educational process and external elements that are designed to contribute to the formation of the procedural component of the entire pedagogical system [4].

Thus, it can be confidently stated that pedagogical conditions are the main component of the pedagogical system; they should reflect the totality of the possibilities of the educational and material-spatial environment; they are characterized by change and development over time.

A systematic analysis of scientific papers on this topic allowed us to conclude that the category «pedagogical conditions» is an integral part of the learning system, reflecting the potential of methods, means, techniques, and methods of teaching, as well as the impact on the formation and development of the student's personality. In our opinion, the organization of independent work of students in an adaptive personalized educational environment is one of the most important pedagogical conditions aimed at the formation of their cognitive activity. An adaptive learning environment is an educational resource that provides an effective, efficient, and personalized learning trajectory to attract all students. Five main technologies can be used in an adaptive educational environment [5] (Figure 1):



Figure 1 – The main technologies of the adaptive environment

All adaptive teaching methods can be applied in the context of secondary vocational education. An adaptive learning system combines the advantages of online learning. Adaptive learning has gained wide popularity in education due to its flexibility, from the integration of teaching methods into the learning process. In addition, the use of adaptive learning allows you to make changes in learning, create new lesson structures, and make it possible to implement a reliable approach to learning, i.e. when students have the right to choose tasks for themselves. Thus, organizational work in an adaptive educational environment can contribute to the improvement of the cognitive skills of students and the formation of a positive attitude to the learning process. At the same time, adaptive learning is mainly used to organize effective independent work. The main advantages of organizing independent work in an adaptive educational environment are as follows: static (they sit at the same table), dynamic (they sit at neighboring tables in a group, everyone works together), and paired-variant (including four people, where each person works first with one person, and then with another person) [6]. Therefore, due to the diversity of the content of education, forms and methods of teaching, and situational methods, the organization of independent work of students in an adaptive educational environment also contributes to the formation of their independent cognitive activity. It complements traditional teaching methods with online tests and quizzes, videos, and podcasts. This combination of activities motivates students and involves them in the educational and cognitive process.

For a teacher working on adaptive technology, the learning goals begin with the words: «find out», «explore», «learn to do», «define», and «prove». In other words, the starting point for such training is the student and not an abstract program that needs to be mastered according to educational standards. With this targeted approach, students are more involved in classes and motivated, plan their educational trajectory better, and achieve better results.

The emergence of adaptive learning is associated with the growth of big data technology, data is generated at an increasingly high rate, which gave rise to Data-Intensive Science, the fourth paradigm of scientific research. Under the influence of data-intensive science, adaptive learning has become a paradigm for the study of fifth-generation educational technologies. Based on big data, has become an important part of the digital learning environment.

The experimental part of the study establishes the early level of formation of cognitive activity of students, develops it, and implements it in the training course on the organization of independent work in the adaptive educational environment of the direction «Mathematics». To diagnose the initial levels of formation of cognitive activity of students, we used the following methods: diagnostics of cognitive activity of students in the process of teaching mathematics (developed by Pashnev B.K. [7]), the questionnaire «My favorite academic subjects», the methodology for assessing cognitive activity (according to Yu.A. Konarzhevsky [8]).

Results and discussion

Experimental work on the implementation of the tasks was carried out based on the Aktobe Higher Polytechnic College from January to March 2022. The study involved 32 people – second-year students. To study the level of cognitive activity of students in the mathematics lesson, a study of students of two-second courses was conducted, one of which (first group – 15 students) became a control (CG), and another (second group – 17 students) – experimental (EG). In both classes, the subject «Mathematics» was taught within the framework of standard curricula in the specialties of technical and vocational education, approved by the order of the Minister of Education and Science of the Republic of Kazakhstan.

To identify the initial level of cognitive activity, a traditional lesson was conducted in both groups [9]. According to the results of the lesson, students had to fill out two questionnaires to identify their level of cognitive activity and determine a favorite/unloved subject in college. Also in this lesson, an independent observer (a computer science teacher) assessed the cognitive activity of students (forms for filling out questionnaires are presented in appendices 3 and 4).

The questionnaire for assessing the cognitive activity of students contains 52 test questions with a single answer. The study was conducted using a written questionnaire, during which the respondents' attitude to mathematics and study was revealed, and the degree of their interest in the educational process, and the desire to learn something new was determined. The results were evaluated on the following scale: 0–12 (0–11) points – low; 13–25 (12–24) – average; 26–42 (25–42) – high.

As a result of processing the responses received, the following indicators were identified, presented in table 1.

Table 1 – Diagnostics of cognitive activity of students of control and experimental groups (according to Pashnev B.K. [7])

The level of cognitive activity	Several students, people		Percent, %	
	CG	EG	CG	EG
Low (from 0 to 12 points)	4	5	27%	29%
Average (from 13 to 25)	7	8	46%	47%
High (from 26 to 42)	4	4	27%	24%

The data obtained show that 4 people (27%) from CG and 5 people (29%) from EG have a low level of cognitive activity, characterized by a low and unstable cognitive interest in facts, low communicative activity, misunderstanding of the goals put forward by the teacher, and lack of desire to follow them. The volitional sphere is characterized by inertia and passivity. Self-control is episodic according to the standard or absent. All educational and cognitive activity of students takes place at the reproductive level with the help of a teacher.

7 (46%) and 8 (47%) CG and EG people, respectively, showed an average level of cognitive activity, which is characterized by interest and significance in the study of mathematics. The content of academic subjects becomes the personal value of students. Students are already more active in the classroom, they can complete tasks without the help of a teacher, but periodic assistance is still required.

4 people have a high level of cognitive activity in CG and EG (27 and 24%, respectively). Such students are characterized by a high cognitive interest in the facts being studied, a high degree of independence, and initiative in the classroom. Students are involved in the learning process in the classroom, ask questions, express and argue their opinions, are efficient, and strive to solve more complex tasks. The teacher only directs students to the truth and knowledge.

Table 1 shows that the level of cognitive activity in general among respondents is at an average and low level, which indicates the need to develop and introduce innovative means of increasing cognitive activity to the study of mathematics into the educational process.

The diagnostic results are shown in Figure 1.

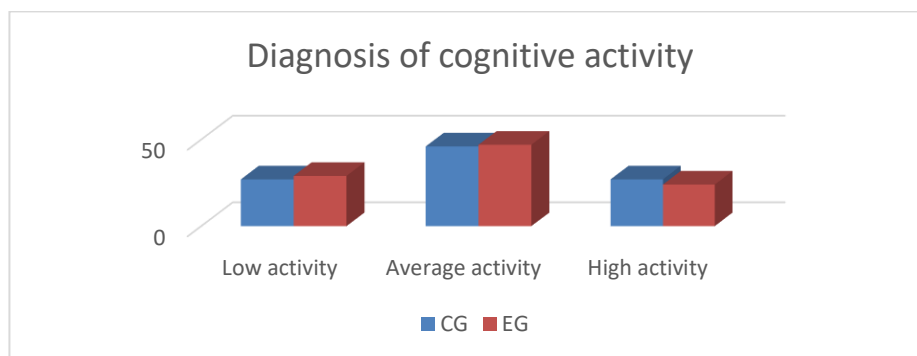


Figure 1 – Diagnostics of cognitive activity of students in first and second groups (ascertaining experiment)

In the course of the study, a questionnaire «Favorite subjects in college» was also conducted, during which students were asked to choose 3 favorite and 3 unloved subjects from the provided list of subjects studied. The purpose of this questionnaire was to identify the level of interest in the subject «Mathematics». Based on the results, a rating table was compiled in which the items are arranged according to the answers received (Table 2; Figure 2).

Table 2 – Results of the survey «My favorite academic subjects»

Rating place №	CG	EG
1	Professional foreign language	Physical culture
2	Business School	Web technologies
3	Mathematics	History of Kazakhstan
4	History of Kazakhstan	Mathematics
5	Web technologies	Business School
6	Physical culture	Professional foreign language

Based on the data obtained, it can be concluded that the subject of «Mathematics» as a favorite is approximately at the same level in both the control and experimental groups. In first group (control group), 4 students (22%) named him as a favorite, in second group (experimental group) – 3 (19%) (Figure 2). It is also worth noting that «Mathematics» was chosen as an unloved subject in both classes by 2 students, which is 12% of respondents in each group.

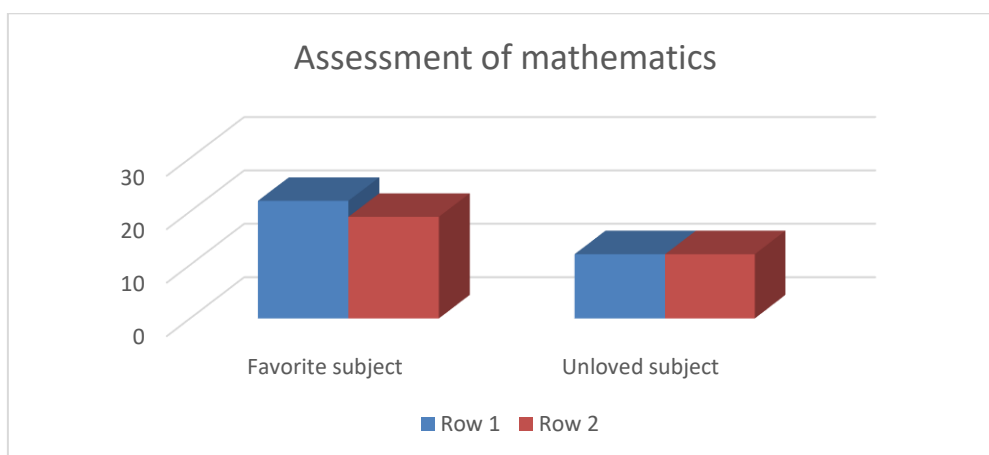


Figure 2 – Assessment of mathematics as an academic subject of students of the first and second group (ascertaining experiment)

The questionnaires 1 and 2 filled out by the students were processed by the teacher. The main task of these questionnaires was to establish the level of cognitive activity in general and for the subject «Mathematics», students assessed their interests themselves. The teacher stated the facts and set the level according to the key in the methodology. The need for these questionnaires is to comprehensively assess the level of cognitive activity: not only on the part of the teacher but also on the part of the student.

Questionnaires №3 and 4 were filled in by the supervising teacher. Questionnaire №3 was developed based on the questionnaire on the assessment of cognitive activity proposed by Yu.A. Konarzhevsky [8], containing two grades of assessment: high and low levels of activity in 4 positions, which are disclosed in Table 3.

Table 3 – Characteristics of high and low levels of activity (according to Konarzhevsky Yu.A. [8])

High level	Low level
Fast, active orientation in new material	Training activities operations are not related to each other in a holistic training activity
The ability to independently identify key concepts	When completing the task, the teacher's help is needed
The ability to master mental operations	Lack of understanding of the meaning of the educational task
Activity, initiative, finding non-standard solutions	A small application of personal efforts in academic work

As a result of observations and an observer's assessment of the work of the two groups, it can be concluded that, in almost all points, the level of cognitive activity in the two groups is approximately the same (Table 4; Figure 3). The results of the assessment of cognitive activity are presented in Table 4.

Table 4 – Results of the assessment of cognitive activity of students at the stage of the ascertaining experiment (according to Yu.A. Konarzhevsky [8])

Evaluation criteria	Evaluations	
	First group (control group)	Second group (experimental group)
Orientation in the educational material (low/high)	Low	Low
The level of independence in the implementation of key concepts (low/high)	High	Low
Understanding and acceptance of the learning task (low/high)	High	High
Mastery of mental operations (low level/high level)	High	High

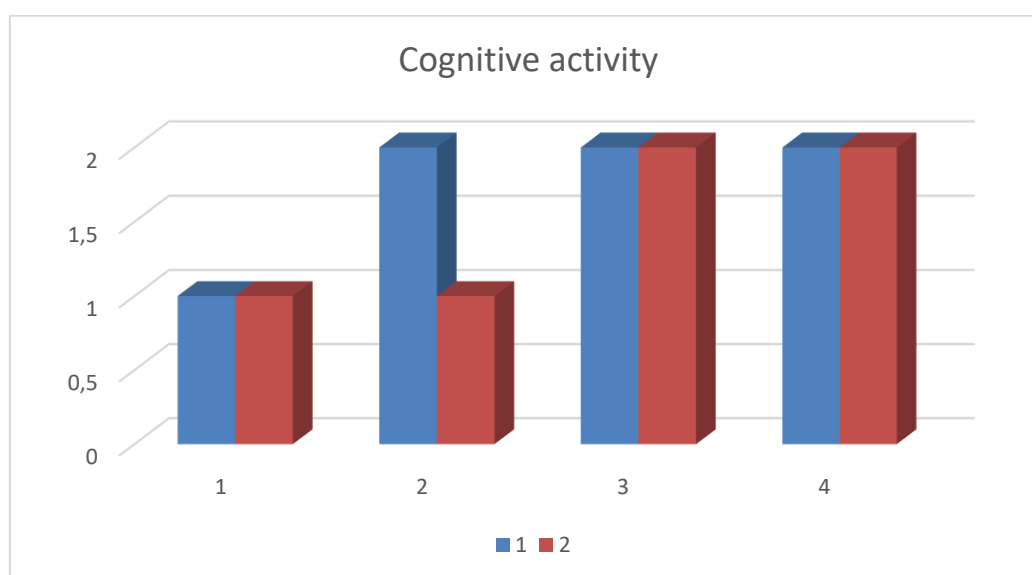


Figure 3 – Cognitive activity of students (according to Yu.A. Konarzhevsky [8] at the ascertaining stage (1 – low level, 2 – high))

Explanations: 1 – Orientation in the educational material (low/high); 2 – The level of independence in performing key concepts (low/high); 3 – Understanding and acceptance of the learning task (low/high); 4 – Mastery of mental operations (low/high level).

The purpose of questionnaire 3 was to identify individual elements of cognitive activity in a math lesson, such as orientation in the educational material, the level of independence in performing key concepts, understanding, and acceptance of the learning task, and mastery of mental operations. Evaluation of the results of activity on questionnaire 4 revealed that students are poorly oriented in the educational material and have a low level of independence in completing tasks, but they are quite good at mental operations and accept the educational task [10].

Questionnaire №4 was also developed to assess the cognitive activity of students. The questionnaire contains 7 positions, which are also filled in by the observer. The results were evaluated at three levels: low (less than 50% of students are active); medium (51–80%); high (more than 80%).

Conclusion

The analysis of the results of the questionnaire and testing showed that the students had a lower level of cognitive activity, i.e. their motivation to study was relatively low, cognitive activity was situational, and when working independently they experienced negative emotions. To increase the level of cognitive activity of students, we have developed and implemented an adaptive training course.

The final analysis of the diagnostic results and processing of the data obtained by mathematical statistics methods showed the presence of positive dynamics in the level of cognitive activity of students participating in the experiment. They have a higher level of educational motivation, cognitive activity does not require external stimuli from the teacher. The student strives to complete more complex tasks, uses different approaches to completing tasks, and works independently. The educational and cognitive activity carried out was creative.

Based on the results obtained, we came to the following conclusions. The organization of independent work of students in an adaptive educational environment is an important pedagogical condition that contributes to the formation of their cognitive activity. The use of adaptive educational environment resources in the organization of independent work contributes to an increase in the level of motivation, activity, and formation of intellectual and motivational qualities, which are key components of the cognitive activity of students.

BIBLIOGRAPHY

1. Кабыткина И.Б. Познавательная активность студентов: проблемы и пути повышения // Международный научно-исследовательский журнал. – 2021. – №6(108). – С. 88–91.
2. Бочкарева Т.Н. Познавательная активность студентов вузов как психолого-педагогическая проблема // Современные исследования социальных проблем. – 2017. – Том 8. №1 – С. 18–31.
3. Гацоев Д.В. Развитие познавательной активности студентов при обучении иностранному языку в неязыковом вузе // Педагогика. Вопросы теории и практики. – 2016. – №1(01). – С. 17–19.
4. Герасимов С.В. Познавательная активность и понимание // Вопросы психологии. – 1994. – №3. – С. 15–25.
5. Зверева Л.Г., Карафанасьева Е.С. Использование электронных образовательных ресурсов при изучении математики // Международный журнал гуманитарных и естественных наук. – 2022. – №1-1 (64). – С. 140–142.
6. Евтушенко Ю.Л., Сирик С.Н., Поволоцкий К.В. Педагогические условия формирования учебнопознавательной активности курсантов военных училищ // Педагогика и психология. – 2020. – №2. – С. 258–263.
7. Пашнев В.К. Психодиагностика: практикум школьного психолога: (индекс одаренности, склонность к творчеству, познавательная активность). – Ростов-на-Дону: Феникс, 2010. – 316 с.
8. Конражевский Ю.А. Анализ урока. – Москва: Пед. поиск, 2000. – 334 с.

9. Модернизация образования: развитие идей Ю.А. Конаржевского: V Всероссийские Конаржевские чтения / сост. О.Д. Лапицкая, Е.И. Шилова. – Псков: ПОИПКРО, 2014. – 104 с.
10. Shchedrina, E., Valiev, I., Sabirova, F., & Babaskin, D. Providing Adaptivity in Moodle LMS Courses // International Journal of Emerging Technologies in Learning. – 2021. Vol. 16, No.02. – P. 95–107.

REFERENCES

1. Kabytkina I.B. Poznavatelnaia aktivnost studentov: problemy i puti povysheniia [Cognitive activity of students: problems and ways to improve] // Mejdunarodnyi nauchno-issledovatel'skii jurnal. – 2021. – №6(108). – S. 88–91. [in Russian]
2. Bochkareva T.N. Poznavatelnaia aktivnost studentov vuzov kak psikhologo-pedagogicheskaia problema [Cognitive activity of university students as a psychological and pedagogical problem] // Sovremennye issledovaniia socialnykh problem. – 2017. – Tom 8. №1 – S. 18–31. [in Russian]
3. Gacoev D.V. Razvitie poznavatelnoi aktivnosti studentov pri obuchenii inostrannomu iazyku v neiazykovom vuze [Development of cognitive activity of students when teaching a foreign language in a non-linguistic university] // Pedagogika. Voprosy teorii i praktiki. – 2016. – №1(01). – S. 17–19. [in Russian]
4. Gerasimov S.V. Poznavatelnaia aktivnost i ponimanie [Cognitive activity and understanding] // Voprosy psikhologii. – 1994. – №3. – S. 15–25. [in Russian]
5. Zvereva L.G., Karafanasieva E.S. Ispolzovanie elektronnykh obrazovatelnykh resursov pri izuchenii matematiki [The use of electronic educational resources in the study of mathematics] // Mejdunarodnyi jurnal gumanitarnykh i estestvennykh nauk. – 2022. – №1-1 (64). – S. 140–142. [in Russian]
6. Evtushenko Iu.L., Sirik S.N., Povolockii K.V. Pedagogicheskie usloviia formirovaniia uchebnopoznavatelnoi aktivnosti kursantov voennykh uchilish [Pedagogical conditions for the formation of educational and cognitive activity of cadets of military schools] // Pedagogika i psihologiya. – 2020. – №2. – S. 258–263. [in Russian]
7. Pashnev V.K. Psihodiagnostika: praktikum shkolnogo psihologa: (indeks odarennosti, sklonnost k tvorchestvu, poznavatelnaia aktivnost) [Psychodiagnostics: a school psychologist's workshop: (giftedness index, creativity propensity, cognitive activity)]. – Rostov-na-Donu: Feniks, 2010. – 316 s. [in Russian]
8. Konarjevskii Iu.A. Analiz uroka [Lesson Analysis]. – Moskva: Ped. poisk, 2000. – 334 s. [in Russian]
9. Modernizaciia obrazovaniia: razvitie idei Iu.A. Konarjevskogo: V Vserossiiskie Konarjevskie chteniia [Modernization of education: the development of the ideas of Yu.A. Konarzhovsky] / sost. O.D. Lapickaia, E.I. Shilova. – Pskov: POI PKRO, 2014. – 104 s. [in Russian]
10. Shchedrina, E., Valiev, I., Sabirova, F., & Babaskin, D. Providing Adaptivity in Moodle LMS Courses // International Journal of Emerging Technologies in Learning. – 2021. Vol. 16, No.02. – P. 95–107.