формирования познавательных способностей; содержание обучения; продуктивные методы и средства обучения в контексте межпредметных связей нестандартные организационные формы; методы контроля и результаты формирования познавательных способностей в контексте междисциплинарных связей; учащихся, а также критерии и уровни их формирования.

Ключевые слова: *начальная школа, межпредметные связи, обновленная программа, учащиеся, познавательные способности, формирование.*

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NEW APPROACHES TO LEARNING USING PBL AND CLIL TECHNOLOGIES AS WAYS TO INCREASE THE PRODUCTIVITY OF BILINGUAL TEACHING OF BIOLOGY

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Abstraact. *In this article shown the effectiveness of introducing PBL and CLIL learning technologies into the educational process in accordance with modern learning conditions and the possibility of increasing productivity, as well as interest among students. In the course of the research, special attention was paid to the application of innovative methods in groups with bilingual education, which requires new approaches both in teaching and in the criteria for assessing achievements.*

The new technologies obtained in the course of practical application in the framework of teaching topical issues in the field of biology and ecology have led to opportunities both to expand the abilities of students in narrow areas of science and to allow directing education in an independent direction.

In addition, the article developed new criteria for assessing learning outcomes in PBL on given topics, which made it possible to assess the achievements of students in the framework of a non-traditional innovative method and which are advisory in nature for bilingual education in the field of biology, biotechnology and ecology. As a PBL product in the experimental groups, the search topic "Drinking water resources in the southern region of Kazakhstan" was proposed, which is of current practical importance.

In addition, CLIL technology teaching methods were proposed to determine the level of independent learning: gesture animation, the use of visual aids and props, introductory scaffolding: research and animation.

Keywords: *project-based learning, research-based implementation, content and language integrated learning, Vygotsky's productivity formula, CLIL-Workout, practical guidelines of teacher, bilingual teaching.*

Introduction. In the 21st century, the educational system faces the urgent problem of using new approaches in teaching. The reason for this is the decline in interest in school among children of today's school age. Firstly, the widely used social networks overwhelm the brain with information overload. However, there are questions about the quality and accuracy of this information flow. In addition, requirements for the level of education of modern students are increasing, which can be evidenced by the complexity of Olympiad tasks and tests. In order for the education of teenagers to meet the above-mentioned requirements, the education sector should also become competitive. For this reason, introducing new learning methods and modern evaluation methods is an high-priority issue.

The third reason: foreign experiences and mastering them in that language and using them in the process of learning a foreign language is one of the most important requirements for the modern education of the Republic of Kazakhstan. To these reasons the prevalence of this issue has increased significantly, contributing to serious discussions about its advent.

Taking into account the relevance of the mentioned CLIL technology and PBL method, we intended to use these methods in the educational process in the field of natural science as the main goal.

Based on this goal, we have taken the following **tasks** as a basis:

1. selective analysis of current topics for the purpose of in-depth teaching of modern scientific achievements in the educational process

2. Compilation of the implementation plan among learners during training based on CLIL technology; monitoring and supervision of the educational process; evaluation of educational results, design of a descriptor

3. Organize and plan the work of groups among educators on the basis of PBL teaching technology; monitoring the course of practice; evaluation of the educational process, design of a descriptor

4. analysis of the results of the introduction of educational technologies into the educational process, formulation, recommendations.

Scientific news

For the first time, two different teaching technologies (PBL, CLIL) were used for the same topic in the educational process, and the results were formulated.

Practical value. Today, the requirements for teachers are very high, a teacher should not only know his subject well, but should be versatile, up-to-date and creative. For this, the teacher should master the new technologies of teaching, be able to arouse the desire of the students for the lesson, and the students should be not only listeners, but also seekers during the lesson.

To open students' desire for knowledge:

• It is necessary to use different methods in the process of checking students' knowledge and assigning tasks;

• The teacher must be able to connect the previous lesson material with the new one;

• It is necessary to be able to reveal students' interest in research;

• New methods should be used in each new lesson.

Currently, emphasis is being placed on education in three languages. In fulfillment of this requirement, CLIL technology is a fundamental teaching method for subjects taught in English, for example, in biology, chemistry, and physics. CLIL или Content and Language Integrated Learning, was firstly introduced into educational process in 90s of XX century, by D. Marsh. According to D. Marsh, CLIL is a method of teaching of a certain discipline, the study of which is carried out in a foreign language. The main goal of this educational technology is teaching the discipline while learning in a foreign language [1].

Therefore, language learning can be done through any subject. For example, the use of CLIL technology saves the time of using a foreign language and ensures that the teacher conducts lectures in two languages at the same time. Learners constantly repeat a foreign language in a practical context. CLIL technology can be applied to all subjects except the mother tongue, which means that the language does not become an object of learning, but can be a tool for it.

In learning the methods used in the new educational process in scientific work, a number of foreign colleagues compared the traditional training in the multidisciplinary direction and the laboratory-experimental training process. For example, Michael Hernandez and his colleagues in his published work about the PBL technology achieved the following achievements [2]:

- Setting students up for success from the beginning: establish target goals
- Keeping students on track: feedback and corrections should happen frequently
- Evaluation must be “two way street”: feedback from peers, teachers and audience
- New ways of constructive criticism: Critique sandwich, Rose/Thorn/Bud methods

In our studies we also implemented the assessment approaches from this research works.

According to the results achieved by Key Bentley in the book "The TKT course CLIL module", the CLIL technology has the following advantages: 1) introduce learners to new concepts through studying the curriculum in a non- native language 2) improve learners’ production of the language of curricular subjects 3) improve learners’ performance in both curricular subjects and the target language 4) increase learners’ confidence in the target language and the L1 5) provide materials which develop thinking skills from the start 6) encourage stronger links with values of community and citizenship 7) make the curricular subject the main focus of classroom materials [3].

In accordance with the results of Kazakhstani authors’ researches, who used CLIL training, it is stated that CLIL training can be used as a tool for the formation of functional literacy of high school students as part of the general educational programs [4].

Educational system of Singapore is the example of positive integration of English language into educational process. For instance, when comparing analysis of native teachers of bilingual education, we have noticed that learning in English and native language showed positive results, and nowadays in Singapore there is active program of bilingual education. Schools try to choose suitable method of learning, in order to learn knowledge for learners, also government of country supports the mentioned educational approaches.

Singapore's educational system is an example of the positive integration of the English language into the learning process. For instance, in a comparative analysis of domestic teachers of bilingual education, it was found that teaching in English and in the native language showed positive results, and a bilingual program is currently being actively

implemented in Singapore. Schools are trying to choose the appropriate method of teaching languages in order to master the knowledge of students and the government of the country supports appropriate education. [5].

A number of authors in a field of natural sciences paid special attention to the problem of activeness of individuals as a relevant issue in educational practice.

A number of authors in the field of natural sciences paid special attention to the problem of personality activity in learning as one of the topical issues in educational practice. The authors singled out the issues of personality activity in learning as a leading factor in achieving learning goals and overall personality development. In addition, the authors indicate ways to organize lessons based on modern active learning methods [6].

A new benchmark study funded by Lucas Education Research conducted by researchers from the University of Southern California and Michigan State University proves that project-based learning is effective. The strategy transcends traditional curricula for all students, not just high-achieving students, but across grade levels and racial and socioeconomic groups.

Leal's, who is a first-generation college student, is part of a new generation of classes that transform traditional teacher-led instruction into a more student-centered, project-based approach. Students learn to work together as they tackle complex, real-world problems that emphasize uncertainty, iterative thinking, and innovation. Proponents of project-based learning (PBL) argue that it fosters a sense of purpose in young learners, pushes them to think critically, and prepares them for modern careers that prize skills like collaboration, problem-solving, and creativity [7].

According to the results achieved by B. F. Klimova, in the book "CLIL and the teaching of foreign languages", she mentioned the following advantages of using CLIL technology in teaching:

- It develops plurilingual interests and attitudes, communication skills
- It accesses subject-specific target terminology [8].

Other authentic teacher who used student-driven approaches to project-based learning believes that this can improve student outcomes. D. Peek-Brown has always believed in weaving project-based learning into her instruction. Today, Peek-Brown helps support other teachers in moving to a project-based approach in which projects drive the lesson, as opposed to being tacked on at the end. Students learn through asking authentic questions about real problems and creating projects that tackle those problems. “That power of ‘I can figure things out for myself,’ is such an important skill for kids to develop and one that they will use for the rest of their lives,” Peek-Brown says.

Specifically, the findings, released in 2021, show that:

• Middle school students in California who learned science with a project-based curriculum outperformed their peers by 11 percentage points on a science assessment and also did better on the state’s end-of-year math and English language arts assessments.

Taken together, these studies provide clear evidence that rigorous project-based learning has a strong effect on student achievement. The research also found that these PBL programs improved certain aspects of social and emotional learning, and these effects were consistent across racial and socio-economic groups [9].

In other article claim that when teaching methods such as PBL are used, in which the teacher poses a question or a challenge connected with the reality, the degree of involvement of students seems to increase. In this sense, the students participate collaboratively in all the

proposed assignments: understanding and interpretation of data, collection of information, preparation of partial deliveries, writing of the final report, and oral presentation before others, assessing the problem or challenge proposed with the intention of being able to draw their own conclusions [10].

Methods and objectives of research. To achieve the research purpose, 9th grade students of the secondary school were selected as the research object. In addition, CLIL and PBL teaching technology main approaches were used as the main research methods. For instance, in the course of using PBL training, we used possible technologies in the lessons: teamwork, collecting data, defense of portfolio.

For evaluation of learners' academic performance during implementation of CLIL technologies into educational process, we used next assessment methods. In particular, PBL works were estimated by public evaluation, that includes various elements, such as constructive criticism, Rose/Thorn/Bud method. Teacher assessment and monitoring of research work diary were held as well.

Evaluation of CLIL work results were according to the principles of Bloom taxonomy.

Research results and their analysis. In the course of experimental works next topics of current interest that can have non-trivial solutions in the field of natural sciences were offered. Particularly, «Drinking water resources in the southern region of Kazakhstan», «Cultivation of microalgae», «Natural sources of medicinal herbs».

The following stages were planned in the introduction of PBL teaching technology into the educational process:

1. Stage of organization: defining the performing team, assigning tasks to be performed within the team

2. To present to the teams a list of relevant topics to be covered in the field of natural science and choose one clearly (teamwork)

3. Provide plans for laboratory practical training and theoretical training (collecting data,).

4. Monitoring the learning process (regular filling of work diary, collection of research results in a portfolio, defense of portfolio)

5. Introducing a descriptor into the teaching technology and offering an evaluation method.

In the process of searching for the solutions on the topics above offered to teams, were carried out weekly monitoring and corrections of work errors, their dynamics were fixed by teacher in a work diary. Moreover, public evaluation method, with the elements of constructive criticism and Rose/Thorn/Bud, was helpful among students. Obtained results of public rating and teacher's own assessment were summarized together and presented below in the descriptor (Table 1.)

Table 1. Teacher assessment of the results of PBL technology

	Assessment elements	Point (percentage in %)	Rating of groups					
			points of each member	I	points of each member	II	points of each member	III
1	Activeness during search of literature review	10	8	8	8	7	9	8
2	Level of conducting experiment	10	9	10	6	8	7	9
3	Analysis and processing of received results	10	6	7	5	6	5	8
4	Interaction between groupmates (verbal communication)	10	9	9	8	10	9	8
5	Interconnection of scientific work with other sciences	10	5	7	7	8	4	6
6	Practical recommendations on obtained results	10	10	8	10	8	7	7
7	Defence of portfolio	40	35	38	32	36	34	32
8	Total	100	82	87	76	83	75	78

According to the plan of our research work, next stage of experiment was research of topics on the above, namely, «Drinking water resources in the southern region of Kazakhstan», «Cultivation of microalgae», «Natural sources of medicinal herbs», using CLIL technology.

In particular, we used following components of the teaching: pre-teaching vocabulary, animated gesturing, use of visual aids and props.

According to the method of comparative assessment based on Meyer's CLIL-pyramid, we have analyzed the results in accordance with the descriptor below.

During the first stage of assessment of CLIL process, we will offer pre-teaching vocabulary, use of visual aids and props, animated gesturing.

As a second stage were chosen activities such as choosing a multimodal format by choosing a learning material. During this process, Meyer recommends taking into account different learning models and different educational levels of learners. For example, it can be implemented through pre-teaching vocabulary.

In planning of next stage, particular attention was paid to language capabilities of students as well as their basic knowledge level in a field of biology. Herewith, special clause during studies were fluent communication in English within one topic, using methods such as Speed dating.

This method provides dialogue between learners on given topic with the set of certain terms. Furthermore, dialogue is maintained only on given topic, so it allows learners to feel comfortable to communicate. Also, while discussing various scaffolding materials were implemented, for example: animated gesturing, use of visual aids and props.

At the final stage of our studies, based on the pyramid of Meyer [12], we conducted CLIL-Workout, placed at the top of the pyramid (Figure 1).

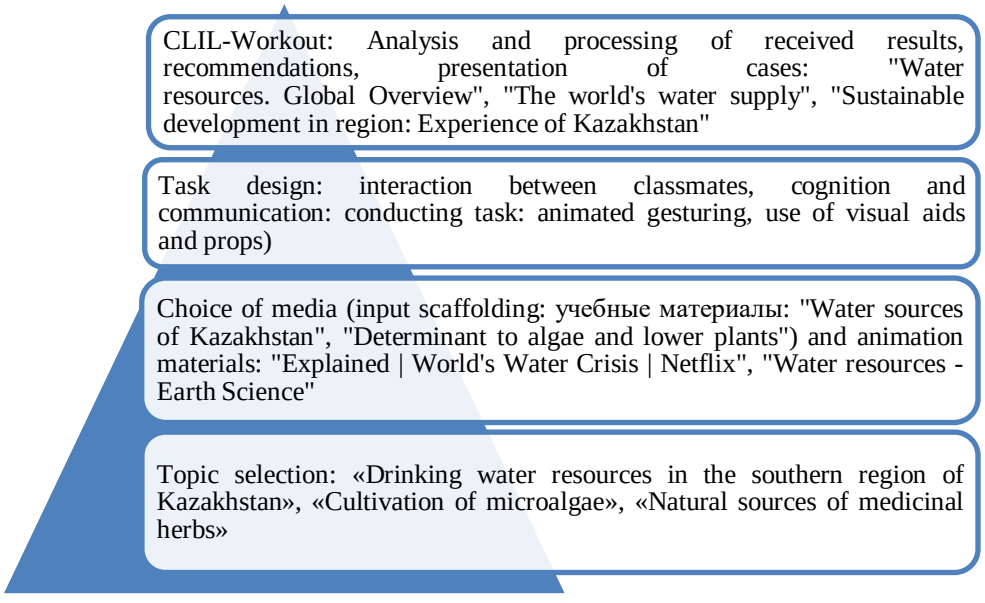

Figure-1. Plan of education to the topic «Drinking water resources in the southern region of Kazakhstan» based on CLIL technology

As a finished product on a given topic, we chose a Case, the quality of which, as well as the execution process itself, helped to track progress among the trained audience.

At the end of the presenting finished work descriptive analysis was made by the table shown below (Table 2).

Table 2. Teacher assessment of the results of CLIL technology

	Assessment elements	Point (percentage in %)	Rating of learners					
			points of each member	I group	points of each member	II group	points of each member	III group
1	Topic selection: (pre-teaching vocabulary)	15	11	13	15	13	12	11
2	Choice of media (input scaffolding: study and animation materials)	15	8	10	9	9	14	13

3	Task design: interaction between classmates, cognition and communication: conducting task: animated gesturing, use of visual aids and props)	15	12	15	15	14	15	13
4	CLIL-Workout: Analysis and processing of received results, recommendations, presentation of cases	40	28	30	32	30	31	28
5	Evaluate: constructive criticism among the teams, also practical guidelines of teacher on obtained results	15	10	11	12	10	14	11
	Total	100	69	79	83	90	86	85

According to the conception of O. Meyer, successful teaching based on CLIL technologies is connected with understanding the content, as well as communication in a foreign language, cognition, comprehension of studying object itself. In our case, content represented the subject content, consistent with the calendar plan.

The element of communication in foreign, and in our case in English, was based on pre-production (Pre-teaching vocabulary), and on using of special methods of conversational speech in a dialogue during the lesson (Speed dating). Learners involved active speaking skills with the use of basic knowledge of foreign language through dialogue method. To add to it, integration of English language came along with the development of skills in a field of natural sciences.

Moreover, in the teaching of natural sciences, namely of biology in integration with CLIL technologies, special attention was paid to multimodal input into educational process.

Among others, using of Scaffolding (scientific video, schemes, animated props and aids), facilitated the development language skills of students, also out-of-the-box thinking under offered for work topics. Besides it, they started intensively applying ready-made speaking markers both in communication and writing various essays and reports, which facilitated the development of fluent english speaking on narrow themes in the field of biology. Thus, in the experimental audience, due to the intensive use of elements of CLIL technology, not only the level of knowledge in a certain direction increased, but also contributed to an improvement of language capabilities among students.

According to the results obtained, announced in the above tables, we carried out, according to the Vygotsky formula, an analysis of productivity:

Mse=Ko/Kn*100%

There are:

Mse- productivity of each student in one group (%)

Ko-criteria of every student

Kn- counts of criteria all the students in the group

Experiments with the use of PBL technology were analyzed in certain teams and made it possible to compare the level of productivity among them.

1-group's member 82/87*100%=94.2%;

2-group's member 76/83*100%=91.5%;

3-group's member 75/78*100%=96.1%

Also we can evaluate the productivity rate change of each student on different activities. For example, student from second group during giving practical recommendations on obtained results, showed 125% productivity.

The next stage of our analysis was to study the results of team productivity in the process of applying CLIL technology.

1-group's member 69/79*100%=87.3%;

2-group's member 79/83*100%=95.1%;

3-group's member 90/86*100%=104%

As a result of the productivity analysis of one student, taken as an example from the third team, showed that during CLIL-Workout: Analysis and processing of received results, recommendations, presentation of cases, student showed 110.7% productivity.

According to the results obtained, we carried out a comparative analysis of the level of productivity of the results of using two different technologies.

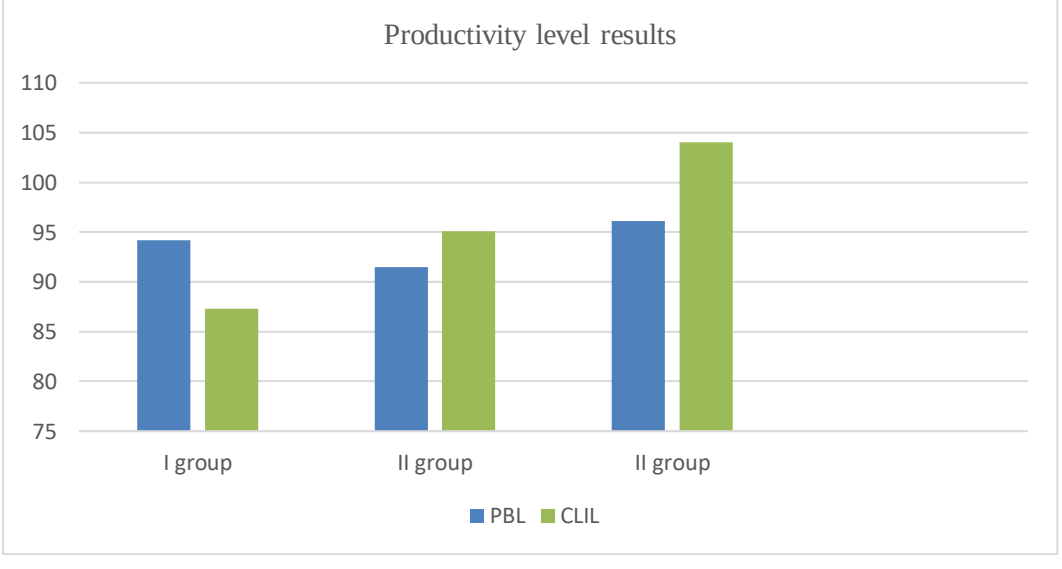

Figure-2. Productivity level results

Conclusion. From the study findings we can make the following conclusions:

a) These findings provide evidence for concluding that the use of project based learning facilitates higher level of learning and understanding of the lesson that leads to improved academic performance. For instance, applying modern educational technologies allows to enhance learning consolidate the learned material, overall as a result of using CLIL technology efficiency showed in average 95,4 %, whereas assessment of PBL technology identified a 93,9% improvement in comparison with initial level. The percentage distribution of productivity of three groups were derived from calculations according to "Vygotsky's production formula".

b) Project based learning technique being student centered approach, change students' attitudes towards education positively that contribute towards self-study of educational materials. In addition, working as a team involves the development of communicative skills. As a practical recommendation, we can offer the use of the latest teaching methods, along with traditional methods, especially in the English gradient classes. Because, even learners claim that they acquired absolutely another point on studying process, namely that it can be fun.

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PBL және CLIL технологияларын қолдана отырып биологияны қостілді оқытудың тиімділігін арттырудағы жаңа тәсілдер

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Аңдатпа. *Мақалада PBL және CLIL сияқты жаңаша дәстүрлі емес оқыту технологияларын қазіргі білім беру шарттары, өнімділікті арттыру мүмкіндіктері және оқушылардың қызығушылықтарына орай оқу процесіне енгізудің тиімділігі көрсетілген. Зерттеу барысында инновациялық әдістерді оқыту мен жетістіктерді бағалауда жаңашылдықты қажет ететін билингвалды оқытылатын сыныптарға енгізуге басты назар аударылды.*
Биология мен экология бағыттарының өзекті мәселелерін қарастыру мен практикалық қолданудағы жаңа технологиялар білім алушылардың нақты ғылым бағыттарындағы мүмкіндіктерін ұлғайта отырып, оқыту процесін өз бетінше жүргізуге ынталандырады.
Сонымен бірге, мақалада PBL бойынша белгілі тақырыпқа арналған нәтижелерді бағалаудың жаңа критерийлары құрастырылып, олар дәстүрлі емес инновациялық тәсілдерді қолдану барысында білім алушылардың жетістіктерін бағалауға мүмкіндік берген. Аталған мүмкіндіктер биология, биотехнология және экология бағыттарында билингвалды оқытуға арналуда ұсыныстық мазмұн тасымалдайтын құрал болып келеді. Тәжірибелік топтарда PBL өнімі ретінде «Drinking water resources in the southern region of Kazakhstan» атты өзекті практикалық маңызы бар тақырып ұсынылған.
Сонымен бірге, тәжірибелер барысында CLIL технологиясын қолдануда өз бетінше оқу деңгейін анықтайтын әдістер ұсынылды: ым-ишара анимациясы, көрнекі құралдар мен реквизиттерді пайдалану, сүйемелдеу құралдарын енгізу, зерттеу және анимация.

Тірек сөздер: *жобалық оқыту, зерттеу негізінде жүзеге асыру, пәндік-тілдік интеграцияланған оқыту, Выгоцкийдің өнімділік формуласы, CLIL-Воркаут, мұғалімнің практикалық нұсқаулары, билингвалды оқыту.*

Новые подходы в обучении с применением PBL и CLIL технологии как способы повышения продуктивности билингвального обучения биологии

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Аннотация. *В данной статье показана эффективность внедрения технологий обучения PBL и CLIL в учебный процесс в соответствии с современными условиями обучения и возможности повышения продуктивности, а также заинтересованности среди обучающихся. В ходе исследований особое внимание было уделено на применении инновационных методов в группах с билингвальным обучением, требующим новых подходов как в обучении, так и в критериях оценивания достижений.*

Полученные в ходе практического применения новые технологии в рамках обучения актуальным вопросам в области биологии и экологии, привели к возможностям как расширить способности учащихся в узких направлениях науки, так и позволить направить обучение в самостоятельное русло.

Кроме того, в статье разработаны новые критерии оценивания результатов обучения по PBL на заданные темы, которые позволили оценить достижения учащихся в рамках нетрадиционного инновационного метода и несущие рекомендательный характер для билингвального обучения в области биологии, биотехнологии и экологии. В качестве PBL продукта в экспериментальных группах была предложена тема поиска «Drinking water resources in the southern region of Kazakhstan», имеющее актуальное практическое значение.

Кроме того, были предложены методы обучения по CLIL технологии , позволяющие определить уровень самостоятельного обучения: анимация жестов, использование визуальных средств и реквизитов, вводный скаффолдинг: исследование и анимация.

Ключевые слова: *обучение на основе проектов, научно-исследовательская реализация, содержательно-языковое интегрированное обучение, формула продуктивности Выгоцкого, CLIL-Воркаут, практические рекомендации преподавателя, билингвальное обучение*

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ОРГАНИЗАЦИЯ НАУЧНО-МЕТОДИЧЕСКОЙ РАБОТЫ НА БАЗЕ УЧЕБНО-ПРОИЗВОДСТВЕННОГО НАУЧНОГО КОМПЛЕКСА «БОТАНИЧЕСКИЙ САД» г. ТУРКЕСТАН

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