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## Development of environmental competence of students through facilitation technology

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**Abstract.** *This article is a part of the long-term work of the author, which continues to this day, devoted to the study of the problems of the formation and development of environmental culture and environmental competence of the individual.*

*The authors share their experience in developing students' environmental competence through facilitation technology. The authors reveal the concept of 'facilitation technology', as well as its essence and main methods. Directly, the technologies 'World Cafe' and 'dynamic facilitation' are revealed, which were used by the authors in the course of work with students. In the article describes in detail the methodology for using 'dynamic facilitation', 'World Cafe' in the educational process with students in extracurricular work to develop the environmental competence of the individual. The author reveals their essence, as well as the role of a teacher-facilitator in the organization and use of these technologies for the development of students' environmental competence.*

*Also, the authors reveal the concepts of 'competence' and 'environmental competence', their essence through the analysis of research and opinions of scientists.*

*Further, the article provides a description and results of the study, which in turn proves the effectiveness of facilitation technology in the development of students' environmental competence.*

**Keywords:** *competence, environmental competence, facilitation, dynamic facilitation, world café, teacher-facilitator, students.*

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### Introduction

The issue of the formation and development of environmental competence of the individual is important and relevant. It is also actively discussed in the field of education, at conferences, at scientific seminars of the pedagogical community.

President of Kazakhstan K. Tokayev instructed a number of ministries to deal with the problem of environmental education of the younger generation. According to K. Tokayev, it is necessary to pay due attention to the environmental education of the younger generation – in schools and universities. He instructed to carry out the environmental campaign “Birge Taza Kazakhstan” (Clean Kazakhstan Together), designed to strengthen environmental values in society on a systematic basis.

Great attention is paid to environmental education in the instructive-methodical letter of the National Academy of Education named after Y. Altynsarin “On the peculiarities of the educational process in secondary education institutions of the Republic of Kazakhstan in the 2021-2022 academic year”: the course Ecology for the 6<sup>th</sup> grade was proposed, “Ecological culture from an early age” project will be carried out, class hours on the ecology once a month for students in Grades 1-11, etc. The course Ecology introduces students to the basic laws of ecology,

forms a positive, careful attitude to their health, surrounding people and nature, the ability to rationally use and save electricity, water. It also includes material on the ecology of actions. The implementation of a complex of educational activities within the framework of the project "Ecological culture from an early age" contributes to the formation of environmental education of students, careful attitude to the surrounding world. Through the subject areas, students get acquainted with the species diversity of plants and ways to increase ornamental plants (biodiversity); the structure of energy consumption at home and in educational institutions and ways to reduce it (energy conservation); the possibility of economical use of water at school and at home (water conservation); sources of waste generation, defining the ways to minimize them, the introduction of separate garbage collection (waste handling), etc.

The pedagogical community always faces questions: how to teach? How to educate? What methods and technologies will be effective in teaching and upbringing?

In their professional activity, teachers use various methods and technologies of teaching and upbringing, as they are a 'bridge' that leads to the intended goal. There are many different methods and technologies in pedagogy, but their effectiveness is determined by the presence of a certain result in teaching and upbringing.

As part of our research, we propose to use the technology of facilitation in the formation of environmental competence of the individual, as one of the effective methods.

### Literature review

Facilitation technology has appeared relatively recently in the post-Soviet space, but is gaining more and more popularity, as it is a method of assistance in many areas of human life.

Facilitation is a complex and developing concept based on the views of K. Rogers, D. Myers, D. Raf, E.G. Vrublevskaya, O.E. Smirnova, V.E. Sumina, I.Ya. Pundik, A.V. Martynova and other researchers.

From the point of view of pedagogy, the technology of facilitation was studied by R.S. Dimukhametov, L.N. Kulikova, E.Y. Borisenko, E.G. Vrublevskaya.

The term 'facilitation' comes from the English verb facilitate – «facilitate, help, promote».

The concept of 'facilitation' reflects conscious and purposeful activity as a phenomenon inherent in the teacher. The attributes of facilitation are: 1. activity, 2. subject, 3. function, 4. motive, 5. goal, 6. method, 7. subject, 8. method, 9. means, 10. result [1, p.57].

All these create the appropriate conditions for the development and growth of personality, as noted by K. Rogers.

K. Rogers in his work *Freedom to Learn* wrote: "I consider the facilitation of teaching as a process through which we can learn to live ourselves and contribute to the development of the student," which emphasizes that pedagogical facilitation is a process of mutual influence, dialogue and cooperation between the teacher and the student.

Facilitation is a certain way of conducting a dialogue, during which everyone is involved in group activities, flexible and operational management of this process based on creating situations of success and freedom of expression [2, p.7].

Thus, pedagogical facilitation is a special and informal type of communication of the subjects of the pedagogical process, aimed at improving the effectiveness of training and education of the student.

Studies have shown that the main methods of facilitation include: journal of ideas, Delphi method, Mind-map, Open Space, World Cafe, Search for the Future, Summit of Grateful Requests, Strategic Changes in Real Time, Development, Dynamic facilitation, Brainstorming, Metaphorical method, Polarization of Opinions, SWOT analysis, Decision Tree, Moderation, Basic facilitation, etc.

To develop students' environmental competence, we have selected and used such technologies as: 'World Cafe', 'Dynamic facilitation' in our work with students.

What is environmental competence?

Then the question arises: what is environmental competence? What is its essence and content?

The concept of 'environmental competence' consists of two components 'environmental' and 'competence'. Let's consider each concept separately, which together will give us a solution to the problem we are looking at.

E. Haeckel in 1866 called ecology as "the general science of the relationship of organisms to the environment." He defined ecology as the cognition of the economy of nature, the simultaneous study of all the relationships of living things with organic and inorganic components of the environment, including antagonistic and non-antagonistic relationships of animals and plants in contact with each other [3].

To determine the essence of the concept of 'competence', we conducted a content analysis, which contains definitions of scientists given at different times (Table 1).

**Table 1**

**Analysis of the concepts of 'competence' [4]**

<b>Scientist / Source</b>	<b>Competence is</b>
Big explanatory dictionary of the Russian language	having thorough knowledge in any field
I.A. Zimnyaya	a) readiness to manifest personal properties in human activity, behavior; b) knowledge of means, methods, programs for performing actions, solving social and professional tasks, implementing rules and norms of behavior, which constitutes the content of competencies; c) experience in the implementation of knowledge, i.e. skills; d) value-semantic attitude to the content of competence, its personal significance e) emotional-volitional regulation as the ability to adequately demonstrate and regulate the manifestations of competence in situations of social and professional interaction
E.I. Artamonova	personified competence, 'a person in a profession'
A.V. Gagarin and S.A. Mudrak	possession by a person of the relevant competence, including his / her personal attitude to the subject of activity (the ability of a person to integrate knowledge, skills and abilities, ways of using them in a changing environment)
Ju.M. Grishaeva	this is a real experience of putting this activity into practice by a specific person
A.V. Hutorskoj	the totality of the student's personal qualities (value orientations, knowledge, skills, abilities) due to the experience in his / her activity in a certain socially and personally significant area
E.I. Ogarev	evaluative category, it characterizes a person as a subject of specialized labor activity in the system of social labor development, bearing in mind the level of development of his / her ability to make qualified judgments, make adequate and responsible decisions in problematic situations, plan and perform actions leading to the rational and successful achievement of goals
J. Raven	a specific ability necessary for the effective performance of a specific action in a specific subject area and including highly specialized knowledge, special kind of subject skills, ways of thinking, as well as an understanding of responsibility for their actions

Next, we have prepared a content analysis of some definitions of 'environmental competence' (Table 2).

Table 2

## Content analysis of definitions of the concept of 'environmental competence' [4]

Scientist	Definition
E.A. Shulpina	Integration of knowledge, skills in the field of ecology and moral attitude to nature, a personal characteristic that includes a set of knowledge about the natural environment as the most important value, about the nature of the impact and norms of human interaction with the environment; the ability to creatively solve educational environmental problems; experience in practical matters to preserve and improve the environment; environmentally significant personal qualities of a future specialist (humanity, empathy, thrift, responsibility for the results of their environmental activities)
A.N. Zahlebnyj	Application of knowledge about the environment and human activities, environmental risks to health and the ability to act environmentally competently in specific life situations
D.S. Ermakov	Conscious, meaningful mastery of theoretical knowledge, skills, decision-making methods, moral norms, values, traditions necessary for the practical implementation of environmentally sound activities
A.I. Novik -Kachan	The unity of theoretical (a set of environmental knowledge, skills and abilities) and practical (organizational and communicative skills) readiness to carry out professional activities
S.A. Stepanov	The most important personal education of a student and the most important indicator of the formation of his / her ecological-oriented worldview, ecological consciousness and ecological culture of the individual
S.N. Glazachev, A.V. Gagarin	The ability, willingness and experience of a person to preserve the habitat, solve environmental problems
Ju.M. Grishaeva	the ability and readiness for ecological and pedagogical activities aimed at creating and maintaining an effective ecological and educational space that contributes to improving the level of ecological culture of all participants in pedagogical interaction
M.V. Emelyanova	integrative personal education, manifested as its ability to effectively interact in the "Man – Society – Nature" system, to be ready for professional activity in the field of environmental education of schoolchildren
G.M. Galiyeva, I.T. Gaissin	An integrative quality of a person that determines the ability to interact in the "Nature – Man – Society" system in accordance with the acquired environmental knowledge, skills, beliefs, motives, value concepts, environmentally significant personal qualities and practical experience of environmental activities
M.H. Akhmetova	The system of internalized ecological knowledge, skills and abilities formed in the process of socialization, externalized in the daily practices of the individual

We arranged this content analysis on an increasing basis from 2001 to 2016 in order to monitor changes in the scientists' view of the concept of 'environmental competence'. The analysis showed the consensus of scientists that 'environmental competence' is associated with knowledge and activity aspects. A characteristic feature of environmental competence is its true expression in practical environmental-oriented activities.

Also, based on these definitions, we can conclude that the ecological competence of a person can be considered as a link in the system of the most important components of an environmentally oriented personality – ecological culture, ecological consciousness, environmental education, environmental education, environmental activities.

## Materials and methods

As we wrote earlier, to develop students' environmental competence, we used the following facilitation technologies: 'Dynamic facilitation' and 'World Cafe'. Let's take a closer look at Dynamic Facilitation.

The founder of the Dynamic Facilitation method is J. Raf, who focused on uncovering the creative potentials of colleagues and solving problems through collective insight.

Dynamic facilitation is one of the methods of group and individual work with students, which refers to a self-organizing process in which the teacher-facilitator starts the process, and the students themselves decide how they will discuss issues, how they will interact with each other, how they will make a decision (which may not be unanimous).

This method of facilitation contributes to achieving changes (solving a specific problem, developing a common vision, an action plan, etc.), which can be used for both small and large groups of people [5, p. 55; 6; 7].

Dynamic facilitation can take place as a one-time event or as a series of cycles of 2-3 hours per meeting.

In our case, we used Dynamic Facilitation on a one-time basis in the course of working with students as part of extracurricular work, as we alternated with other methods for the development of environmental competence of the individual.

Prior to the start of the work, the teacher-facilitator conducted an anonymous questionnaire *Environmental Competence of the Individual* to identify the level of environmental competence of students.

The test, consisting of 25 questions, uses a 6-point scale of self-assessment of personal qualities that characterize the level of development of environmental competence of a particular student, where 0,1,2,3,4,5,6 denote a different degree of quality expression. The test is divided into the following macro components: environmental education, environmental literacy, environmental awareness, environmental activity. Levels were defined for each macro component: low, medium, high. The survey was conducted at Alikhan Bokeikhan University and Shakarim University of Semey (Table 3). The results of the survey are presented in Table 3.

Table 3

### The level of formation of environmental competence of students at universities

Degrees	Shakarim University of Semey	Alikhan Bokeikhan University
Environmental Literacy		
Low	9.3	11.4
Average	45.3	72.8
High	45.3	15.8
Environmental Education		
Low	62.7	95.6
Average	34.7	4.4
High	2.7	-
Environmental Awareness		
Low	6.7	4.4
Average	36.0	69.3
High	57.3	26.3
Environmental Activity		
Low	13.3	7.0
Average	50.7	77.2
High	36.0	15.8

The data of the ascertaining experiment made it possible to determine the experimental group, which was performed at Alikhan Bokeikhan University (Table 4).

Table 4

**Number of control and experimental group students involved in the experiment**

No	Name of the university	Quantitative composition	
		Experimental group (EG)	Control group (CG)
1	Shakarim University of Semey	-	75
2	Alikhan Bokeikhan University	114	-

All proportions in relation to the general population of each university are maintained in the sample. The sample is representative, which, in our opinion, will be able to reflect the qualities of interest as much as possible.

The second stage was that the teacher-facilitator explained to the students the methodology by which the work will be carried out, i.e.:

- \* We reveal our creative potential, as well as the ability to think big.
- \* We collect a puzzle from the opinion of each student to prepare the overall picture.
- \* We speak in turn, since the teacher-facilitator is able to listen to only one student at a time.
- \* We listen to each student to the end without interrupting. This is a new format for discussing the problem.

\* We observe a simple principle: be yourself, speak your mind [8; 9].

Then the teacher-facilitator announced the topic of discussion «Ecology of my city: problems and solutions» for group discussion and building solutions to the problem.

During the discussion, the students listed a number of the following problems that they consider important:

- household waste pollution, including an abundance of ‘flying bags’;
- air pollution by exhaust gases;
- poor landscaping;
- poor-quality street cleaning work.

The teacher-facilitator recorded the student’s question and gave him / her the opportunity to answer and speak out on the solution of the question without hurrying. During the work, the basic principle of dynamic facilitation was observed – equal attention to each student.

During the alternate discussion the students began to listen and understand that the solutions they proposed and the solutions of others were not ideal. Students began to realize that everyone sees the problem and its solution differently. And it was here that the realization came that it was necessary to find a common solution to the problem.

Also, in working with students, we used the following facilitation technology as a World Cafe.

The students really liked this technology, as there were proposals to use it in other practical classes as well.

Genesis shows that the World Cafe technology has been known in the world since 1995. It was developed in California in 1995 by a small group of business and science leaders who gathered at the home of Juanita Brown and David Isaacs in Mill Valley. No one planned to create a social innovation that would spread rapidly around the world in the following years. In the morning they settled down in a large circle in the courtyard of the house, but their plans were disrupted by rain. After moving into the house, the participants spontaneously divided into two groups, which settled down at the tables. From time to time, the groups broke off to switch tables and exchange ideas. The communication turned out to be much more fruitful than they could have imagined. This is how the World cafe technology appeared – a method of focused informal discussion. In 2005, David and Juanita wrote a book about this method, *The World Cafe: Shaping Our Futures Through Conversations That Matter*.

In Kazakhstan, the World Cafe technology is used in the form of methodical classes for teachers, parent meetings, conferences, and trainings. The results of working with the World cafe technology showed excellent results in an adult team.

World cafe technology is a dynamic format for organizing collective activities aimed at a quick exchange of opinions and experience between participants [10; 11; 12].

This technology is used to solve complex problems, get answers to several questions, make non-standard decisions, combine several points of view, plan group work, summarize the results of the project, conference, training, year, exchange of experience.

The main advantages of the World Cafe technology are:

- an incentive to intense mental work, to organize the search for joint solutions;
- speeding up the development of resolutions, improving their quality, achieving involvement, responsibility of each pupil of the educational process for the decision made.

This method usually requires from forty minutes to three hours, depending on the number of participants and the issues being resolved. No special skills are required from the teacher-facilitators: teacher's task is to observe the timing and instruct the participants.

As previously described, it is necessary to create a caring space (creating a cozy home environment, a simultaneous sense of security and invitation). When people feel comfortable, they can think, talk and listen more creatively.

Also, the most important characteristic of the technology is the ability to move between tables, meet new people, actively express their opinions and thoughts, connect the quintessence of 'travel' during discussion cycles. When participants transfer key ideas or topics to new tables, they change perspectives, significantly enhance the opportunities for unexpected solutions [13, 14].

The usual number of participants is at least 12-15 people. They sit down three or four at a table. At the same time, one person becomes the 'master' at the table, the rest are his / her 'guests'. There must be paper tablecloths or whatman, as well as felt-tip pens or colored pencils, since all ideas must be recorded in any form – a record, drawing, diagram. After a certain time, the 'guests' go to the next table, where they act as 'messengers of new ideas', the 'host' remains in place and introduces the new 'guests' who have come to him to the course of business: presents the main considerations considered before. The work should continue taking into account everything that the previous 'guests' have prepared. After several such visits to neighboring tables, everyone gathers for a general discussion of the topic.

According to this scheme, work was organized with students in the educational program 'Pedagogy and methods of primary education' in the number of 21 people.

The topic for discussion was 'Me and ecological culture'. The 'atmosphere' of the World Cafe was prepared in advance by the teacher-facilitator: tables, flowers in vases, water and sweets. And also watmans, colored pencils, felt-tip pens. In total, 4 tables were prepared: 3 tables for 5 students and 1 table for 6 students. 2 hours were allotted for the disclosure of the topic.

## **Results and discussion**

Following the discussion, the teacher-facilitator created sheets 'Formulation of problems', 'Proposed solutions', 'Concerns', 'Points of view' with results and bookmarks. These bookmarks allowed evaluating the work done. These bookmarks make it possible to track the dynamics of changes in students' opinions.

Also at the end of the work, a "paper tablecloth vernissage" is arranged – the results of all participants are posted for general review and discussion; other options are possible.

The students defended the results of their creative works in front of the cafe guests. Then these creative works were placed in the gallery of the faculty, which attracted the views and interests of other students.

The main idea of World Cafe is to make sure that people know the solution to any problem without even realizing it. Only in the course of a confidential and relaxed conversation, with a

certain amount of humor – no matter what serious topic is discussed – it is possible to ‘pull’ to the surface the knowledge that everyone needs so much. World Cafe gives teams new impulses, this technology allows you to get the whole palette of people’s opinions.

World Cafe technology does not reduce the importance of each student’s activity, does not ignore his / her own efforts and the overall result depends on the quality of everyone’s work.

Based on the results of the students’ work, the main components of environmental culture were identified: environmental education, environmental education, environmental activity and environmental consciousness. Students depicted their thoughts in the form of drawings, diagrams and models on the drawing boards. The discussion was very fun, fascinating and informative.

In both cases, the work of the teacher-facilitator was planned as noted by R.S.Dimukhametov: technologies and methods of teaching and upbringing from the point of view of facilitating management consist in the organization of group and collective forms of thinking, allowing to combine the creative efforts of each listener and contributing to the manifestation of his potential, forming not like-mindedness, but the ability of a special vision of the problem based on images, metaphors, comparisons, analogies, etc., contributing to the transformation of the known into the unknown, the ordinary into the unusual. The analysis of various points of view on the problems of education plays an important role in the development of critical thinking. The essence of technologies and methods of teaching and upbringing in the context of facilitating management is that in the course of the lesson, various points of view are analyzed, generated, evaluated and criticized by the group itself. The facilitator, developing educational and thematic plans, provides questions and tasks that characterize the polyphony of philosophical, sociological, psychological and pedagogical sciences [1, p.72].

Based on the results of the work, a repeated questionnaire was conducted, which showed a change in the thinking of students (Table 5).

**Table 5**

**The results of the formation of environmental competence**

University	Degree	Environmental literacy		Environmental education		Environmental awareness		Environmental activity	
		Before	After	Before	After	Before	After	Before	After
Shak arim University of Semey	Low	9.3	9.8	62.7	59.4	6.7	3.5	13.3	12.6
	Average	45.3	44.7	34.7	37.5	36.0	37.5	50.7	50
	High	45.3	45.5	2.7	3.1	57.3	59	36.0	37.4
A k i k h a n B o k e i k h a n University	Low	11.4	3.2	95.6	56.9	4.4	0.5	7.0	4.2
	Average	72.8	68.6	4.4	31.2	69.3	40.9	77.2	59.5
	High	15.8	28.2	-	11.9	26.3	58.6	15.8	36.3

According to the data given in Table 5, it is possible to observe positive dynamics in the formation of environmental competence of students in general and, in particular, in macro components.

The final test was carried out after using a number of methods of facilitation technology in working with students not only in the classroom, but also including extracurricular activities.

**Conclusion**

Thus, the facilitation technology allowed students to express their opinions, move away from ‘herd’ thinking, and identify the main components of ecological culture themselves. To understand the harmful effects of man in relation to the environment, identify the sources of pollution and suggest ways to solve them.

The technology of facilitation, namely its components as World Cafe technology and Dynamic Facilitation due to the fact that the method of forming environmental competence takes

place in a relaxed informal setting gives very good positive results. It is gratifying that students ask to use such facilitation technologies in further classes.

Thus, we can conclude that the use of facilitation technologies has a positive effect on the development of environmental competence of students.

The Dynamic facilitation and World Cafe technology does not reduce the importance of each student's activity, does not ignore his / her own efforts and the overall result depends on the quality of everyone's work and the proper preparedness of the facilitator.

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### Фасилитация технологиясы арқылы студенттердің экологиялық құзыреттілігін дамыту

**Андатпа.** Бұл мақала тұлғаның экологиялық мәдениеті мен экологиялық құзыреттілігін қалыптастыру және дамыту мәселелерін зерттеуге арналған автордың көпжылдық жұмысының бір бөлімі болып табылады. Экологиялық құзыреттілікті дамыту мәселесін зерттеу барысында ғалымдардың көптеген еңбектері зерттеліп, әртүрлі әдістер мен технологиялар қарастырылды.

Мақалада авторлар фасилитация технологиясы арқылы студенттердің экологиялық құзыреттілігін дамыту тәжірибесімен бөліседі. Авторлар «фасилитация технологиясы» ұғымын, сондай-ақ оның мәні мен негізгі әдістерін ашады. Студенттермен жұмыс барысында авторлар қолданған «әлемдік кафе» және «динамикалық фасилитация» технологиялары тікелей ашылады. Авторлар мақалада жеке тұлғаның экологиялық құзыреттілігін дамыту бойынша аудиториядан тыс жұмыста, студенттерге білім беру және тәрбие процесінде фасилитация технологиясының «динамикалық фасилитация» және «әлемдік кафе» технологияларын қолдану әдістемесін егжей-тегжейлі сипаттайды. Автор олардың мәнін, сондай-ақ студенттердің экологиялық құзыреттілігін дамыту үшін осы технологияларды ұйымдастыруда және пайдалануда педагог-фасилитатордың рөлін ашады.

Сондай-ақ, авторлар «құзыреттілік» және «экологиялық құзыреттілік» ұғымдарын ғалымдардың зерттеулері мен пікірлерін талдау арқылы мәнін ашады. Аталған ұғымдар бойынша көптеген ғалымдардың анықтамалары мазмұнды талдау түрінде берілген.

Әрі қарай мақалада зерттеудің сипаттамасы мен нәтижелері келтірілген. Зерттеу нәтижелері студенттердің экологиялық құзыреттілігін дамытуда фасилитация технологиясының тиімділігін дәлелдейді.

**Түйін сөздер:** құзыреттілік; экологиялық құзыреттілік; фасилитация; динамикалық фасилитация; әлемдік кафе; педагог-фасилитатор; студенттер.

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### Развитие экологической компетентности студентов посредством технологии фасилитации

**Аннотация.** Данная статья является частичкой многолетнего труда авторов, который имеет продолжение и на сегодняшний день, посвященного изучению проблем формирования и развития экологической культуры и экологической компетентности личности. В ходе исследования данной проблемы изучены многочисленные труды ученых, рассмотрены различные методы и технологии.

В данной статье авторы делятся опытом развития экологической компетентности студентов посредством технологии фасилитации. В статье авторами раскрывается понятие «технология фасилитации», а также ее сущность и основные методы. Непосредственно раскрываются технологии «мировое кафе» и «динамическая фасилитация», которые были использованы авторами в ходе работы со студентами. Авторы в статье подробно описывают методику использования «динамической фасилитации», «Мирового кафе» в образовательно-воспитательном процессе со студентами во внеаудиторной работе по развитию экологической компетентности личности. Авторы раскрывают их сущность, а также роль педагога-фасилитатора в организации и использовании данных технологий для развития экологической компетентности студентов.

Также в статье авторами раскрываются понятия «компетентность» и «экологическая компетентность», их сущность через анализ исследований и мнений ученых.

Далее в статье приведены описание и результаты исследования, что, в свою очередь, доказывает эффективность технологии фасилитации в развитии экологической компетентности студентов.

**Ключевые слова:** компетентность; экологическая компетентность; фасилитация; динамическая фасилитация; мировое кафе; педагог-фасилитатор; студенты.

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