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ВЕСТНИК

РОО «НАЦИОНАЛЬНОЙ
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В 2016 году для развития и улучшения качества жизни казахстанцев был создан частный Благотворительный фонд «Халык». За годы своей деятельности на реализацию благотворительных проектов в областях образования и науки, социальной защиты, культуры, здравоохранения и спорта, Фонд выделил более 45 миллиардов тенге.

Особое внимание Благотворительный фонд «Халык» уделяет образовательным программам, считая это направление одним из ключевых в своей деятельности. Оказывая поддержку отечественному образованию, Фонд вносит свой посильный вклад в развитие качественного образования в Казахстане. Тем самым способствуя росту числа людей, способных менять жизнь в стране к лучшему – профессионалов в различных сферах, потенциальных лидеров и «великих умов». Одной из значимых инициатив фонда «Халык» в образовательной сфере стал проект Ozgeris powered by Halyk Fund – первый в стране бизнес-инкубатор для учащихся 9-11 классов, который помогает развивать необходимые в современном мире предпринимательские навыки. Так, на содействие малому бизнесу школьников было выделено более 200 грантов. Для поддержки талантливых и мотивированных детей Фонд неоднократно выделял гранты на обучение в Международной школе «Мирас» и в Astana IT University, а также помог казахстанским школьникам принять участие в престижном конкурсе «USTEM Robotics» в США. Авторские работы в рамках проекта «Тәлімгер», которому Фонд оказал поддержку, легли в основу учебной программы, учебников и учебно-методических книг по предмету «Основы предпринимательства и бизнеса», преподаваемого в 10-11 классах казахстанских школ и колледжей.

Помимо помощи школьникам, учащимся колледжей и студентам Фонд считает важным внести свой вклад в повышение квалификации педагогов, совершенствование их знаний и навыков, поскольку именно они являются проводниками знаний будущих поколений казахстанцев. При поддержке Фонда «Халык» в южной столице был организован ежегодный городской конкурс педагогов «Almaty Digital Ustaz.

Важной инициативой стал реализуемый проект по обучению основам финансовой грамотности преподавателей из восьми областей Казахстана, что должно оказать существенное влияние на воспитание финансовой грамотности и предпринимательского мышления у нового поколения граждан страны.

Необходимую помощь Фонд «Халык» оказывает и тем, кто особенно остро в ней нуждается. В рамках социальной защиты населения активно проводится работа по поддержке детей, оставшихся без родителей, детей и взрослых из социально уязвимых слоев населения, людей с ограниченными

возможностями, а также обеспечению нуждающихся социальным жильем, строительству социально важных объектов, таких как детские сады, детские площадки и физкультурно-оздоровительные комплексы.

В копилку добрых дел Фонда «Халык» можно добавить оказание помощи детскому спорту, куда относится поддержка в развитии детского футбола и карате в нашей стране. Жизненно важную помощь Благотворительный фонд «Халык» оказал нашим соотечественникам во время недавней пандемии COVID-19. Тогда, в разгар тяжелой борьбы с коронавирусной инфекцией Фонд выделил свыше 11 миллиардов тенге на приобретение необходимого медицинского оборудования и дорогостоящих медицинских препаратов, автомобилей скорой медицинской помощи и средств защиты, адресную материальную помощь социально уязвимым слоям населения и денежные выплаты медицинским работникам.

В 2023 году наряду с другими проектами, нацеленными на повышение благосостояния казахстанских граждан Фонд решил уделить особое внимание науке, поскольку она является частью общественной культуры, а уровень ее развития определяет уровень развития государства.

Поддержка Фондом выпуска журналов Национальной Академии наук Республики Казахстан, которые входят в международные фонды Scopus и Wos и в которых публикуются статьи отечественных ученых, докторантов и магистрантов, а также научных сотрудников высших учебных заведений и научно-исследовательских институтов нашей страны является не менее значимым вкладом Фонда в развитие казахстанского общества.

С уважением, Благотворительный Фонд «Халык»!

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METHODOLOGY OF ACTION RESEARCH IN IMPROVING THE ENVIRONMENTAL FUNCTIONAL LITERACY OF HIGH SCHOOL STUDENTS

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Abstract. One of the most basic ways to protect the environment is to teach students environmental knowledge and awareness from an early age. It is very important to educate them to protect nature, use natural resources effectively, and develop a high level of environmental literacy in their living environment and workplace. In this regard, one of the main criteria for successful education must be environmental literacy. In a civilized society, the main task of all educational institutions, e.g. preschool and secondary schools, is to educate an adapted person who can meet the requirements of modern society. The article examines the formation of self-confidence and the ability to move from research to action in students trained on the basis of the program. The main principles of the proposed teaching methodology will increase the knowledge of students by providing guidance to the analysis of deepening their knowledge in a socially critical sense. In addition, the impact of developing students' critical thinking skills on their educational level was discussed. In conclusion, a methodological system was proposed that allows children to freely express their thoughts and opinions, and develops critical thinking skills that contribute to increasing their ecological functional competence.

Keywords: environmental knowledge; environmental literacy; critical thinking; environmental education

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ОРТА МЕКТЕП ОҚУШЫЛАРЫНЫҢ ЭКОЛОГИЯЛЫҚ ФУНКЦИОНАЛДЫҚ САУАТТЫЛЫҒЫН АРТТЫРАУДА ІС-ӘРЕКЕТТІ ЗЕРТТЕУ ӘДІСТЕМЕСІ

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Абстракт. Қоршаған ортаны қорғаудың ең негізгі жолдарының бірі — оқушыларға ерте жастан экологиялық білім мен санаға үйрету. Олардың өмір сүретін ортасы мен жұмыс орнында табиғатты қорғауға, табиғи ресурстарды тиімді пайдалануға, экологиялық сауаттылығын жоғары деңгейде қалыптастыруға тәрбиелеу өте маңызды. Табысты білім берудің басты өлшемдерінің бірі экологиялық сауаттылық болуы тиіс. Өркениетті қоғамда барлық білім беру мекемелерінің, мысалы, мектепке дейінгі және орта мектептердің басты міндеті-қазіргі қоғамның талаптарына сәйкес келетін бейімделген адамды тәрбиелеу. Мақалада өзіне деген сенімділікті қалыптастыру және бағдарлама негізінде оқитын студенттердің зерттеуден іс-әрекетке өту қабілеті қарастырылады. Ұсынылған оқыту әдістемесінің негізгі принциптері студенттердің білімдерін кеңейтуге мүмкіндік береді, олардың білімдерін әлеуметтік сыни мағынада тереңдетуді талдау бойынша ұсыныстар береді. Сонымен қатар, студенттердің сыни ойлау дағдыларын дамытудың олардың білім деңгейіне әсері талқыланды. Қорытындылай келе, балаларға өз ойлары мен пікірлерін еркін білдіруге мүмкіндік беретін және олардың экологиялық функционалдық құзыреттілігін арттыруға ықпал ететін сыни ойлау дағдыларын дамытатын әдістемелік жүйе ұсынылды.

Түйін сөздер : функционалдық сауаттылық, іс-әрекетті зерттеу, экологиялық мәдениет

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МЕТОДИКА ИССЛЕДОВАНИЯ ДЕЯТЕЛЬНОСТИ ПО ПОВЫШЕНИЮ ЭКОЛОГИЧЕСКОЙ ФУНКЦИОНАЛЬНОЙ ГРАМОТНОСТИ СТАРШЕ КЛАССНИКОВ

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Аннотация. Одним из основных способов защиты окружающей среды является обучение учащихся экологическому образованию и сознанию в раннем возрасте. Очень важно воспитывать в среде их обитания и на рабочем месте охрану природы, эффективное использование природных ресурсов, формирование экологической грамотности на высоком уровне. Одним из главных критериев успешного образования должна стать экологическая грамотность. В цивилизованном обществе главной задачей всех образовательных учреждений, например, дошкольного образования и средних школ, является воспитание адаптированного человека, соответствующего требованиям современного общества. В статье рассматривается формирование уверенности в себе и способности студентов, обучающихся на основе программы, переходить от исследования к деятельности. Основные принципы предложенной методики обучения позволяют расширить знания учащихся, дать рекомендации по анализу углубления их знаний в социально-критическом смысле. Кроме того, обсуждалось влияние развития навыков критического мышления студентов на уровень их образования. В заключение была предложена методическая система, которая позволяет свободно выражать свои мысли и мнения и развивает навыки критического мышления, которые способствуют повышению экологической функциональной компетентности.

Ключевые слова: функциональная грамотность, исследование деятельности, экологическая культура

Introduction

The main environmental problems of Kazakhstan are increasing year by year, for example, the rate of mining and processing of minerals is increasing, releasing millions of tons of waste, of which pollution of water and air is increasing year by year (Khamzina, 2022; Abdiyev, 2022; Nueraji, 2023). The pollution index of air also exceeds the permissible level. East Kazakhstan, Karaganda and Pavlodar are among the most polluted cities (Assanov, 2021; Kerimray, 2020). Therefore, our main goal should be to protect the environment to reduce the risk of damage.

Nowadays, many works are focused on solving environmental problems. One of the most basic ways to protect the environment is to teach environmental knowledge and awareness to students from an early age. Incorporating environmental awareness into educational programs is being implemented in all countries. For example, according to a study, 94 countries in the world are considering including environmental topics in educational programs (UNESCO, 2021; Holst, 2020; Zguir, 2021; Laurie, 2016). The United Nations has published a series of policy papers with instructions for the implementation of Education for Sustainable Development (ESD) at the country level (Michelsen, 2017, Jones, 2019). The recommendations from ESD have influenced education policy in a number of countries around the world.

School is a crucial place for the development of environmental education, which should begin in early childhood and continue throughout life in the form of pedagogical approaches that promote dialogue, critical thinking, and the development of functional literacy. A number of studies have been conducted in various countries to introduce environmental education in schools (Misiaszek, 2011; Cracolici, 2010). Research findings show that environmental illiteracy hinders development and slows progress, making it difficult to achieve environmental sustainability in an illiterate society (Stevenson, 2013; Ogunbiyi, 2010). Therefore, a solid education is necessary to spread environmental stewardship. Environmental education enables individuals to know themselves and become aware of their actions that are detrimental to the survival of the environment. In particular, functional literacy must enable adult beneficiaries to meet the socioeconomic demands of the community through meaningful participation in productive activities. Functional literacy, according to Nzeneri, is a socioeconomic or work-oriented literacy curriculum (Dewitt, 2016). The meaning of functional literacy includes the content, mode of delivery, and implementation of acquired information and skills. Interestingly, the benefits of functional literacy include the application of the acquired information and skills in a way that improves the lives of people in society.

Currently, this functional literacy is widely used in the country to help students become well-rounded individuals and develop critical thinking skills. As a method to develop students' environmental literacy, it is used in the process of action research and the results are discussed. In addition, the effectiveness of this action research model and its influence on the development of students' environmental awareness, responsibility for nature and critical consciousness are studied.

Research methods and materials.

Research material is collected and analyzed by conducting various projects with students. The study was conducted as part of an environmental education elective course. The students of Al-Farabi Specialized School (Almaty, Kazakhstan) were participated in the research. A total of 100 students from 8 th to 9th grade. 50 students were selected from 8th grade, 25 girls and 25 boys, and 50 students from 9th grade. 50 students from 8th and 9th grades were trained as part of the research group based on the basis of the ecological program aimed at improving the ecological literacy. The remaining 50 students were taken as the control group, who were taught according to the traditional teaching format. The study consists of the planning, implementation, and evaluation sections. The children were informed about the purpose, content, and learning activities. In addition, the students who participated in this program were first interviewed with a questionnaire and their willingness to participate in the program was determined. The curriculum of this course considers ethical issues (privacy, safety of children, including their physical, emotional, and mental safety).

Action research is an ideal method for environmental education. It allows us to give children an opportunity to form their opinions about the environment and society.

Research aimed at improving students' environmental literacy is conducted in the following 4 main steps (Figure 1).

- Needs assessment
- Preparation of an action research model program
- Move to action
- Feedback

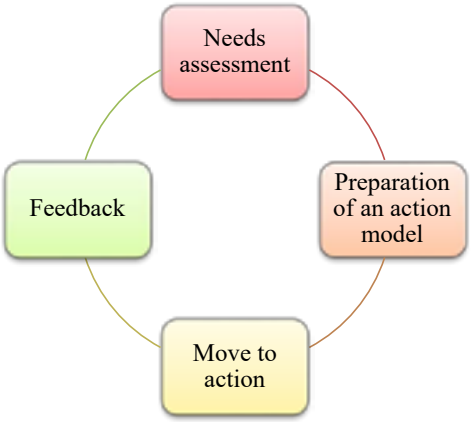


Fig 1 - Study design scheme

Step 1: Needs assessment

Prior to the research, our main goal was to determine students' environmental knowledge and to determine their attitudes toward solving environmental problems. Therefore, research projects were conducted in the following two directions (A, B).

Part A was to determine the environmental knowledge of all students before the study. For example, online surveys were conducted using the Google Forms program and the students' responses were analyzed. These tests contain 30 questions. The correct answer to each question is scored 1 point. The maximum score was 30 points. A survey was sent to 100 students aged 13-14 who participated in the study, and the results of the students in the research group and the control group were analyzed. Interviews with science teachers were also conducted to check the reliability of the student responses.

In Part B, a survey was conducted on 3 questions to determine students' attitudes and activity toward solving environmental problems and to determine their critical thinking skills through their interest. For example:

First question: do you feel responsible for solving environmental problems?

Second question: are you concerned about environmental degradation in the schoolyard?

Third question: how confident are you that environmental problems will be solved in the future? Students' responses to the questions asked were based on a scale of positive or negative attitude.

Step 2: Preparation of the action research model.

In developing the environmental literacy program for the students in the research group, the following steps were taken. (1) Determining the topic to be taught in the program. (2) Implementing a program based on the high school curriculum according to the standards. (3) Creating projects based on the action research model (4) Student feedback.

Step 3: Taking action

Action research is an ideal method in environmental education. It allows us to give children the opportunity to form their opinions about the environment and society. The conversation was the first step to approach the main problems. It lasted about 3 weeks. In this first round, the children participated in a storytelling contest. The students shared their opinions on the following questions.

what places in the city of Almaty do you like and what places do you dislike? Why?

How do you imagine Almaty in 20 years?

what changes would you like to see in Almaty?

In this discussion phase, the research groups exchanged opinions, gave each other feedback and shared the best ideas.

In the second round, the children were asked to photograph the nature in which they live. Simple cameras were used to take photographs. The children photographed their favorite places, the places they disliked, and the places they thought were the best (photo 1 and 2) Afterwards, the children were asked to write down why they took these pictures and what they wanted to show with them. *The third step* was group work. The children were active in the group and participated in an different activity like project work, modeling (Photograph 3 and 4) discussion and poster presentation that lasted about a month. The main question during this time was: when children make decisions and act, how do they influence the environment?

During this time, a group of children enacted scenes of the city that they recognized as good and bad. In this process they began to collaborate and support each other. They performed dramas with educational value and defined their goals. They described the meaning of their actions.

After completing each activity, the children were asked to write an essay expressing their ideas about their perceptions, feelings, and experiences with the environment. The first stage of the educational program – discussion was successfully completed, and the children's main ideas began to emerge. They developed a deep understanding of their environment, felt what they wanted to change and what could be improved. At this stage, students in the research group will improve their knowledge through various projects in the research, such as the study of the problems in the school environment, problems in urban ecology, model making and poster presentation.

Step 4 feedback (Reflection)

The content of the program was evaluated based on students' attitudes toward the program and their feedback. Student feedback was based on the following questions:

- To what extent does the action research model impact the improvement of students' ecological action skills in the research group?

- To what extent does the action research model affect students' attitudes toward solving environmental problems?

- Can the action research model reveal the level of students' ecological functional competence?

The post-research effect of the students who participated in the research, their attitude to the research program, and the knowledge and experience they gained during this period are determined by the following methods. For example, in order to check the theoretical knowledge of the students, multiple choice questions are given and the analysis is made based on the answers of the students. At the same time, with the aim of showing positive aspects of students' attitude towards the environment, 10 questions were asked and their attitude towards the various environmental problems was determined by answering "Yes" or "No". The effectiveness of the action research program, which lasted for almost 3 months, and the feelings and concerns of the students during the research were shown by filling in the reflection sheet "My feeling about environmental education".

Based on these research questions, the research hypothesis was formulated and established:

Null hypothesis: there are no obvious differences in the formation of environmental knowledge between the control group and the studied group (which was trained based on the action research program).

Alternative hypothesis: there is a clear difference between the studied group (the group trained on the basis of the action research program) and the control group. That is, there is no doubt that the action research program influences the formation of environmental culture and knowledge.

Statistical analysis.

The following methods were chosen to analyze the research results. The comparison of students' environmental knowledge before and after the study is calculated and compared using the T-test formula.

$$t = \frac{\overline{x_1} - \overline{x_2}}{\sqrt{\frac{(S_1)^2}{n_1} + \frac{(S_2)^2}{n_2}}} \qquad SD = \sqrt{\frac{\sum(x - \bar{x})^2}{N-1}}$$

Where:

t = student T test

$\sum$ = sum of

SD = standard deviation

X= individual values in set of date

X_1 = the mean experimental group

X_2= the mean control group

S_1= standard deviation experimental group

S_2= standard deviation control group

n_1 = number of experimental group students

$n_{2=}$ number of control group students

N – total number of students.

The pre- and post-research results of students in the control group and the research group were calculated in Microsoft Excel on the basis of the T-student formula.

If Chi Squared Value </= the value for 0.05 probability, you can cannot reject the null hypothesis.

If Chi Squared Value > value for 0.05 probability, you can reject the null hypothesis.

Research results

Needs assessment period

To check students' environmental knowledge before the study, the data analysis method T-test was used to analyze students' answers to 30 questions about environmental issues.

A Direction The table below shows the indicators of environmental knowledge of the students in the control group and the research group before the study according to the T-statistical analysis.

Table 1 - Comparison between the pre-test scores of the control group and experimental group.

Group	N	Mean pre-test	Mean difference	T	p-value	remembers
Control	50	10,42	0,56	-1,49	0,13	Not significant
Experimental	50	10,98	0,56	-1,49	0,13	

(Table 1) shows that the calculated p value (0.13) was greater than the alpha value of 0.05. The pretest means of the experimental group and the control group were not significantly different at the alpha level of 0.05 (t (98) = -1.49, p= 0.13). The magnitude of the mean differences (mean difference = -0.56) with an effect size of 0.3 means that the means of the two groups differed by only one-third of a standard deviation. This is considered a small effect size. Taken together, this indicates that the groups were classified as similar in the measurement of the environmental awareness achievement test and had comparable characteristics, i.e., they were homogeneous. Therefore, null hypothesis which states that there is no main difference concepts, should be accepted (Demir, 2021; Bainbridge, 2015).

It can be seen that the students' environmental knowledge is almost at the same level before the study. When the study focuses on the hypothesis previously established, the null hypothesis was accepted. For example, it was found that there was no clear difference in environmental knowledge among the 100 students who participated in the study, and all of them showed the same level of indicators. This means that students need a comprehensive curriculum to strengthen their environmental knowledge. For example, after three months of research, the results of the environmental knowledge index of 50 students in the research group who were trained with the elective course program created to increase students' functional

environmental literacy and the environmental knowledge index of students in the control group are as follows:

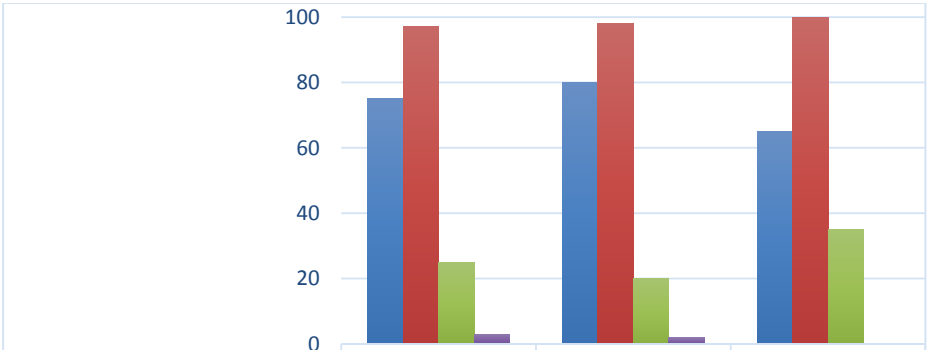
Table 2 - Comparison between the post- test scores control group and experimental group.

Group	N	Mean pre-test	Mean difference	T	p-value	remembers
Control	50	13,24	8,76	-17,56	0.0048	Not significant
Experimental	50	22,4	8,76	-17,56	0.0048	

The t-test result in table 3 below showed that the difference in achievement post-test mean scores of the respondents between the Experimental and Control groups were significant. The t-test analysis results revealed that the computed p-value of 4.8 was less than the alpha of 0.05. Therefore, the post-test mean scores of both experimental group and control group were significantly different at 0.05 alpha level (t (-17.56), p= 4.8) with the experimental group (M = 22.4, SD = 6.1) scoring higher than control group (M = 13.24, SD = 4.7). The magnitude of the differences in the means (mean difference = 8.76) which means that the experimental group is more than 1.4 standard deviations better than the control group in terms of post-test scores. Together, this suggests that there is a significant difference between the control and experimental group (Table 2**)**.

According to the results, environmental education helped to improve students' knowledge about the environment in elementary schools. It was found that after environmental education, students had a much better understanding of the concepts of organic waste, inorganic waste, recyclable waste, reusable waste, and more, which proves the effectiveness of environmental education at a young age (Thompson, 2016). The students' interest in environmental education at school was shown by the fact that 96 % of the students enjoyed the educational activities and 89 % wished to participate in the activities again. The results of this study will contribute to the development of a more comprehensive educational program by providing information on environmental education topics such as waste separation, eco-bags, and food waste collection systems. This will help reduce the environmental pollution caused by solid waste. The research shows that the environmental education provided by the authors has some strategic limitations. Students were only required to complete this environmental education activity once, and the assessments they received were not included in their overall evaluation. For this reason, it is possible that the activities are not taken as seriously and do not really change student behavior.

B direction. Determination of students' attitude towards solving environmental problems.



	responsibility	schoolyard question	future plan
Pssitive control group	75	80	65
possitive experimental group	97	98	100
negative control	25	20	35
negative experimental	3	2	0

Fig 2 - Attitude and activity of students to solve environmental problems.

First question: do you feel responsible for solving environmental problems? Of the 50 students in the control group, 75 % of the students answered that they themselves are responsible for solving environmental problems, while the remaining 25 % of the students showed a negative attitude. Of the 50 students in the research group, 97% answered positively, emphasizing that they are directly involved in the problem, while 3 % expressed a negative attitude.

Second question: are you concerned about improving the environmental conditions in the schoolyard?

To this question, 80 % of the students in the control group answered that they are interested in it, while the remaining 20 % said that they do not think about it at all. And 98% of the students in the research group said that they do think about this issue, while 2 % of the students said that in some cases it is impossible for them to do so.

For the third question, "How confident are you that environmental problems will be solved in the future?", 65 % of students in the control group said they were optimistic about the future, and 35 % of students had a completely negative opinion. And 100% of the students in the research group emphasized that they look to the future with great hope. The results of the study show that the functional environmental literacy of the students in the research group is much higher than that of the students in the control group (Fig 2).

Step 2. Preparation of an action research model program

The knowledge the children gained was very different from that provided by traditional environmental education in Kazakh schools, which is based on

scientific knowledge. Their action knowledge was created through a completely different path: Expression and communication, critical reflection and action. The creation of their action knowledge took place in many interdependent stages. The path from refusal to readiness for action is described in the figure of the action model (see Fig 3). Action research is a type of research that involves a cycle of planning, action, reflection, and evaluation. It is a useful method for studying and improving educational practices, organizational processes, and community programs.

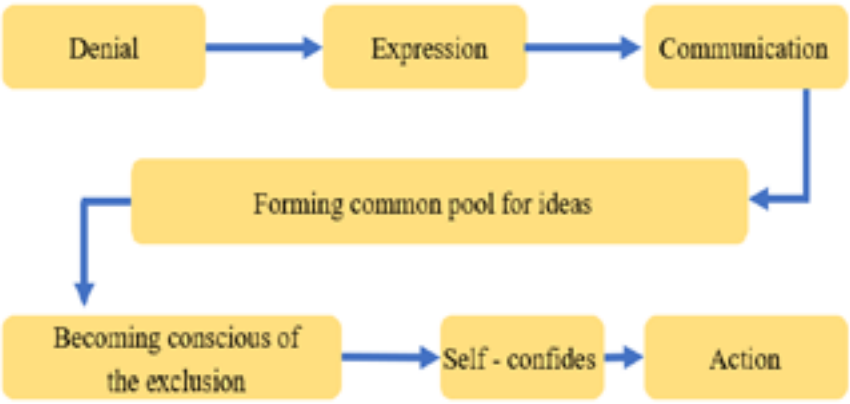


Fig 3 - Action research model

Step 3 take action

Cancel the action. there can be a relation between negative thoughts and the decision to "cancel the action" in action research. Negative thoughts or self-doubt can arise when the planned course of action is not achieving the desired outcomes, or when unexpected challenges or obstacles emerge. These negative thoughts can lead to feelings of frustration, helplessness, or even despair.

Firstly, they may not have a clear understanding of the impact that their actions can have on the environment. Without this knowledge, they may feel that their efforts are insignificant or that they cannot make a meaningful contribution to environmental conservation.

Secondly, children may feel overwhelmed or discouraged by the scale of the environmental problems that they are facing. For example, if they see large amounts of litter or pollution in their community, they may feel that it is impossible to clean up or make a difference.

Thirdly, children may be discouraged by negative attitudes or lack of support from the people around them, such as parents, peers, or educators. If they feel that their efforts are not valued or appreciated, they may lose motivation and stop trying.

Lastly, negative thinking can also arise from a lack of awareness or education about environmental issues. If children do not understand the importance of environmental conservation or the role that they can play in protecting the environment, they may

not feel motivated to take action. To help children overcome negative thinking and feel empowered to make a positive impact on the environment, it is important to provide them with education and resources about environmental issues, as well as opportunities to take action and see the results of their efforts. Parents, educators, and community leaders can also play an important role in encouraging and supporting children's environmental conservation efforts, and providing them with positive feedback and recognition for their contributions.

At the beginning of the research, the students did not have confidence in themselves. Their desire to change their environment was ignored by the adults, and their critical opinions were not taken into account. The children had the following thoughts:

- We are children, no one listens to us (Aiganym).
- You must be kidding, who listens to our thoughts? (Aibek)
- Nobody wants to listen to our thoughts (Daria)

The above answers show that children lack self-confidence, are afraid to act, and have little courage.

After the conversation, alternative thoughts began to appear among the students. Many students began to dream about living in an ecologically clean natural environment with less traffic and building such a city.

- I want less traffic in the area where I live (Asylzhan)
- I'd like to have more places where people can relax (Nuraim)

After the conversation with the students, they realised that solving environmental problems and restoring the environment is in the hands of future generations. After agreeing on a common idea, they gave the following answers depending on the region:

- I admire the natural beauty of Almaty, but I don't like that people litter the city so much. I'd like people to clean up their own garbage (Alizhan).
- In 20 years, I see Almaty as a peaceful city with lots of parks and no cars. (Nadia)
- I wish there were no traffic jams in Almaty (Erasyl)

Most students cited the air pollution caused by the large number of cars in the city and suggested that in the future only public vehicles should be allowed and the movement of private vehicles should be restricted. The next step of the survey conducted with the students was to take photos of places they like where they live and places they don't like, and to say why they took the photo (Fig 4).

Fig 4 - Favorite place of the student and the places they dislike.

- The reason why I photograph the pine mountains of Almaty is that I want such natural places to be preserved forever in our country. (Ardana)

- I don't like the traffic jams in Almaty, that's why I took this photo, after 20 years I want to take a photo right here again and see the change, of course I expect a big change (Aisha)

In the next step, the students' group work in the research group (project work, modeling, discussion and poster presentation), the students showed their ideas that they dream of developing ecologically clean, compliant infrastructures in the future by creating a project for the area where their school is located. At the same time, they shared their ideas and discussed in groups by creating posters and research projects on the topic of ecological disaster areas in Kazakhstan and ways to solve them (Fig 5).

Fig 5 - Students work (My school environment)
Formation of a friendship circle.

One of the most important elements of the environmental protection program was mutual cooperation. The students' ability to listen to each other and treat each other with mutual respect, and the main didactic objectives influenced their common assessment of the importance of the work, so that the students made a common decision with a common idea.

- I liked the environmental project, we expressed our thoughts together (Arsen).

Action skills training.

The methods used during the program, such as environmental drama and

conversation, encouraged students to make decisions based on their own views, develop creativity, and foster critical thinking.

- I let my imagination run wild during the conversation (Nurali)

- I liked that all children have the right to express their opinions (Miras) An important success of the educational program was the children's increased self-confidence in their right to express and claim their opinions. Self-confidence is considered essential for empowering children, as it helps them move from denial to action.

Formation of practical knowledge.

Data analysis is action-oriented and aims to contribute to the formation of new knowledge. Through data analysis, students' self-doubt impacts the complex journey from denial to readiness for action. As mentioned earlier, during the environmental theater, students began to think about their future actions. In this context, they took responsibility for themselves, formed an ecological functional literacy, and developed critical thinking skills.

The progress of students

Table 3 - Performance of respondents on different activities

Different activities	Make a poster	Create project	Performance and photography
N	17	20	13
F (%)	0.34	58.8	0.26

The above results show that the students in the research group actively participated in the research during the class. For example, following the action research model, groups discuss environmental issues together, debate among themselves, and come to a decision based on shared ideas. Most students had excellent and good grades. Looking at the results of the research, a large number of students demonstrated their own effective methods of solving environmental problems in their projects. First of all, students not only presented their ideas on the problem of disposable waste disposal in school, schoolyard design, collection and recycling of unnecessary waste, but also calculated the economic efficiency of the project.

Feedback. Three months after the day on which the environmental education was delivered, students in eighth and ninth grades who were part of the experimental group were given a survey to determine their level of understanding. The purpose of the first survey was to compare students who took part in environmental education to students who did not take part in such programs in order to identify any differences.

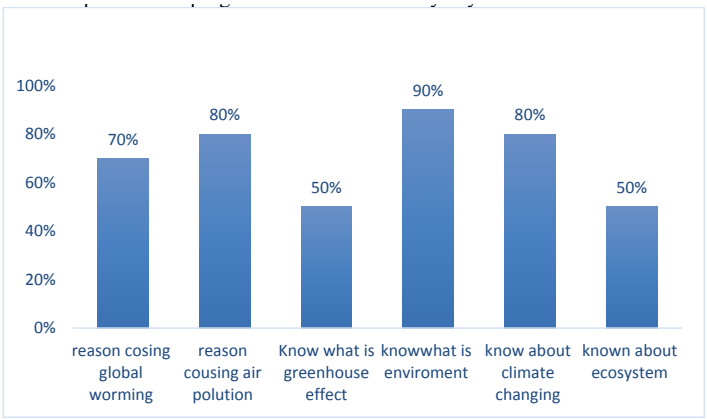


Fig 6 - Shows the basic knowledge about the environment that we summarized in Survey 1.

The questions asked for facts about environmental problems and methods of protection. For example, we asked "What is a greenhouse effect?" and "What are the causes of air pollution?" to obtain the first two results in Fig. 6. The questionnaire contained multiple-choice answers, and students were asked to select the answers they thought were correct. Fig. 6 shows the percentage of students who selected the correct answers. Students were knowledgeable in some areas, such as the causes of air pollution (80 %), the greenhouse effect (50 %), and what the environment means (90 %). However, students knew little about the ecosystem (50 %) (Fig 6).

Survey 2*:* To check the environmental knowledge of the students in the research group, open-ended questions were asked and we checked the students' attitude towards the environment.

Table 4 - Students' attitude towards the environment.

	Yes	No
I understood that environmental pollution has a great impact on human health	85%	15%
I believe that everyone has an impact on the environment	90%	10%
I believe that only adults should think about the environment	20%	80%
We will start our activity by making the school yard bloom	66%	34%
I believe that the increase in population is also the cause of pollution	55%	45%
Humanity can prevent any environmental disasters	90%	10%
Students are not obliged to act for the environment	1%	99%
Environmental education will save humanity	90%	10%
Humanity is the cause of the natural disasters happening on the planet	88%	12%
Overall global warming does better than harm	5%	95%

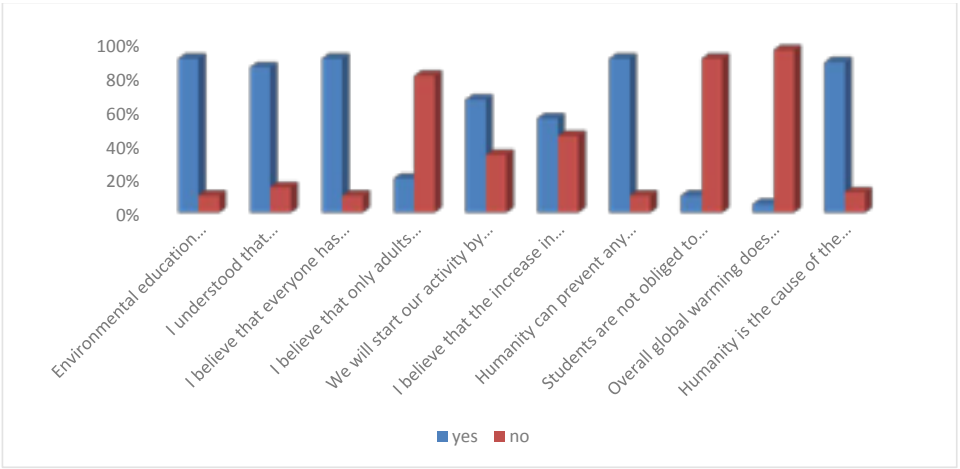


Fig 7 - Environmental knowledge of the students Survey 2.

As can be seen from the results of the study, the answers of the students of the research group who participated in the survey were analyzed. 5 % of the students believe that global warming as a whole causes more benefit than harm, they believe that their evidence is that the increase in the amount of CO_2 in the atmosphere increases the intensity of photosynthesis of plants, and the remaining 95 % of the students believe that this is the direct cause of global warming. 1 % of students believe that solving environmental problems should be the responsibility of adults only. 99 % of students said that after the study they became more responsible and their knowledge about the environment increased significantly (Fig 7).

My feeling about Environmental education activities

After 3 months of research (action research), it was determined how the activities carried out according to the model affected the mood of the students.

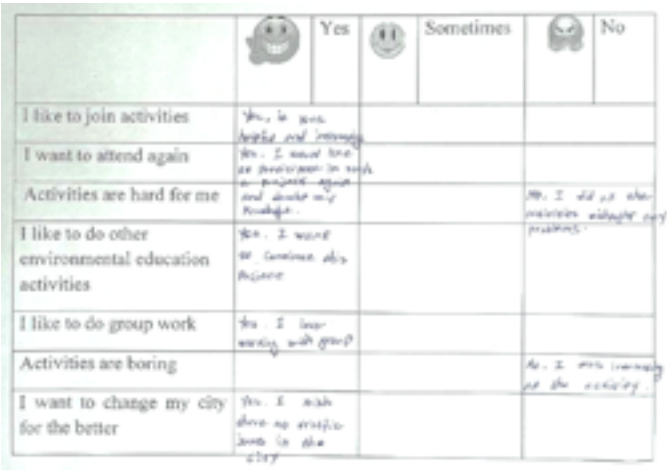


Fig 8 - Students feedback.

According to the findings, environmental education helped children in elementary schools to learn more about the environment. It was found that after environmental education, students knew the terms organic waste, inorganic waste, and recyclable and reusable waste. 96 % of the students were interested in the environmental education taught in class, and 89 % of them wished to participate in the educational activities again (one feedback of students was given as an example in fig 8). The environmental education taught in this study regarding waste separation, eco-bags, and food waste collection systems will help develop a more thorough curriculum to reduce solid waste pollution. The study highlights some tactical limitations of the authors' environmental education. Students participated in this environmental education only once, and the grades they received did not factor into their final grade. For this reason, the exercises may not be taken seriously enough to influence student behavior.

Conclusion

In conclusion, environmental education is a crucial aspect of modern-day education, as it fosters a deeper understanding and appreciation for the environment, its ecosystems, and its resources. This research paper has highlighted the importance of environmental education in promoting sustainable development and tackling the growing concerns of climate change and environmental degradation. The paper has explored various approaches to environmental education, including formal and informal education, experimental learning, and story-based learning, and discussed the benefits and challenges associated with each. In addition, different action research module applied in the study was discussed. Furthermore, the paper has identified the great roles of students in supporting and promoting environmental protection. Overall, the research underscores the need for a concerted effort by all people and government to prioritize and invest in environmental education, as it holds the key to creating a sustainable future for our planet.

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