IRSTI 14.25.09 https://doi.org/10.26577/JES2024v80.i3.012

A. Sadykova[1,2*], M. Mynbayeva[2], G. Ismailova[1], M. Iskakova[1], Zh. Nurtazina[2,3]

[1]Alikhan Bokeikhan University, Semey, Kazakhstan
[2]Autonomous Educational organization «Nazarbayev Intellectual Schools», Semey, Kazakhstan
[3]Shakarim University , Semey, Kazakhstan
*e-mail: ainura_pulsativa@mail.ru

FORMATION OF STUDENTS' SKILLS IN ANALYZING INFORMATION GRAPHS THROUGH CONSTRUCTIVE FEEDBACK

The research topic examines the performance of 12th grade students from the Nazarbayev Intellectual School in Semey in passing external summative exams, comparable to international AS/A-Level standards. The summative assessment system was developed in collaboration with the Cambridge Assessment International Education Council and aims to measure the functionality of acquired knowledge and skills through a variety of tasks performed by students. The study also explores the international program for assessing educational achievements, such as PISA, among students in general education schools and Nazarbayev Intellectual Schools, focusing on mathematical and functional literacy. It was found that international exams like PISA and AS/A-Level often include visual organizers that require high-order thinking skills according to Bloom's taxonomy. Currently, tasks corresponding to this type of international exam are being introduced in schools and universities in Kazakhstan. Therefore, innovative teachers should possess pedagogical and psychological methods and strategies. One of them is the CLIL strategy, which involves using are often accompanied by information graphics as visual organizers and constructive feedback to help students understand and solve tasks in international exams. This research not only examined various visual organizers in summative assessment but also provided constructive feedback to 11th and 12th grade students in biology and computer science. The article also carefully analyzed the analytical reports of international exams.

Key words: constructive feedback, graphic organizers, Bloom's taxonomy, competencies, interpretation.

А.Ж. Садыкова[1,2*], М.М. Мынбаева[2], Г.М. Исмаилова[1], М.О. Искакова[1], Ж.Ж. Нуртазина[2,3]

[1]Alikhan Bokeikhan University, Семей қ., Қазақстан
[2]Дербес білім беру ұйымы «Назарбаев зияткерлі мектептер», Семей қ., Қазақстан
[3] Шәкәрім университеті , Семей қ., Қазақстан
*e-mail: ainura_pulsativa@mail.ru

Оқушылардың сындарлы кері байланыс арқылы ақпараттық графиктерді талдау дағдыларын қалыптастыру

Зерттеу тақырыбы Семей Қаласындағы Назарбаев Зияткерлік Мектебінің 12-сынып оқушыларының AS-/A-Level халықаралық стандарттарымен салыстыруға болатын сыртқы жиынтық емтихандарды тапсырудағы үлгерімін қарастырады..Жиынтық бағалау жүйесі халықаралық білім беру мәселелері бойынша Кембридж бағалау кеңесімен бірлесіп әзірленген және оқушылардың әртүрлі тапсырмаларды орындауы арқылы алынған білім мен қалыптасқан дағдылардың кең спектрлі функционалдығын өлшеуге бағытталған. Зерттеу сонымен қатар математикалық және функционалдық сауаттылыққа баса назар аудара отырып, жалпы білім беретін мектептер мен Назарбаев Зияткерлік мектептерінің оқушылары арасында PISA сияқты оқу жетістіктерін бағалаудың халықаралық бағдарламасын зерттейді. PISA және AS/A-Level сияқты халықаралық емтихандарға көбінесе Блум таксономиясына сәйкес жоғары деңгейлі ойлау дағдыларын қажет ететін визуалды органайзерлер қатысатыны анықталды. Қазіргі уақытта Қазақстанның мектептері мен университеттерінде халықаралық емтиханның осы түріне сәйкес тапсырмалар енгізілуде. Сондықтан жаңашыл мұғалімдердің педагогикалық

лары болуы керек. Солардың бірі жиі пайдалануды көздейтін CLIL стратегиясы – оқушыларға халықаралық емтихандардағы тапсырмаларды түсінуге және шешуге көмектесу үшін визуалды органайзерлар ретінде ақпараттық графиканы және сындарлы кері байланысты қарастырылады. Бұл зерттеу жиынтық бағалауда әртүрлі көрнекі ұйымдастырушыларды зерттеп қана қоймай, сонымен қатар биология және информатика пәндерінің 11 және 12-сынып оқушыларына сындарлы кері байланыс берді. Сонымен қатар мақалада халықаралық емтихандардың аналитикалық есептері мұқият талданды.

Түйін сөздер: конструктивті кері байланыс, визуальді графикалық органайзерлар, Блум таксономиясы, құзыреттер, интерпретация.

А.Ж. Садыкова[1,2*], М.М. Мынбаева[2], Г.М. Исмаилова[1],
М.О. Искакова[1], Ж.Ж. Нуртазина[2,3]

[1]Alikhan Bokeikhan University, г. Семей, Казахстан
[2]Автономная образовательная организация «Назарбаев интеллектуальные школы», г. Семей, Казахстан
[3]Университет Шакарима, г. Семей, Казахстан
*e-mail: ainura_pulsativa@mail.ru

Формирование у учащихся навыков анализа информационных графиков посредством конструктивной обратной связи

Система суммативного оценивания разработана совместно с Советом оценивания Кембриджа по вопросам международного образования и нацелена на измерение функциональности получаемых знаний и сформированных навыков широкого спектра через выполнение учащимися различных видов заданий. Также в статье изучается международная программа по оценке образовательных достижений PISA учащихся общеобразовательных школ и Назарбаев Интеллектуальных школ, таких как математическая и функциональная читательская грамотность. В исследовании выявлено что, международные задании как PISA и AS-/A-Level, часто сопровождаются информационными графиками как визуальные органайзереры, которые требуют навыков высокого порядка по таксономии Блума. В статье рассматриваются результаты работ учащихся 12-ых классов Назарбаев Интеллектуальной школы г.Семей по сдаче внешних суммативных экзаменов, сопоставимых с международными стандартами AS-/A-Level. В настоящее время задания, соответствующие данному типу международного экзамена, инициируются в общеобразовательных школах и вузах Казахстана. Поэтому учитель-новатор должен обладать психолого-педагогическими методами, стратегиями обучения. Одной из стратегий является CLIL, где применяются информационно визуальные органайзеры, и организуется конструктивная обратная связь для понимания и решения студентами заданий при сдаче международных экзаменов. В данном исследовании были рассмотрены не только множество визуальных органайзеров в суммативном оценивании, но также представлены конструктивные обратные связи учащимся 11-12 классов по биологии и информатике. В статье также были тщательно изучены аналитические отчеты международных экзаменов.

Ключевые слова: конструктивная обратная связь, графические визуальные органайзеры, таксономия Блума, компетенции, интерпретация.

Introduction

Assessment has now become an indispensable facet of the educational process, playing a crucial role in gathering and analyzing data on students' progress at various stages of their learning. It is paramount that everyone involved in the teaching-learning cycle, including educators, learners, parents, and the educational institution's administration, can lucidly comprehend the learning objectives, assessment criteria, information-based tasks, as well as the subject, content, goals, methods, forms, and assessment instruments. The assessment system serves as the principal solution for gauging accomplishments and monitoring learning issues, thereby enabling the assessment of the learning quality and its conformity with global standards.

One of the main types of assessment and measurement of 15-year-old children's ability to use their knowledge and skills in reading, mathematics and science to solve real-life problems is PISA (International Student Assessment Program) – it is the OECD's Programme for International Student Assessment (Pulkkinen, 2022: 102000) . The latest results of PISA – 2018 and PISA – 2022 show low development of these skills in Kazakhstan (PISA, 2022) .

In addition, at the end of training under the Educational Program of the Autonomous Educational Organization "Nazarbayev Intellectual Schools"

(AEO) – NIS-Program, students pass examinations – summative assessment (SA) in comparable to international standards AS-/A-Level (12th grade). . The SA system was developed in conjunction with the Cambridge Council for Assessment of International Education (CCAIE) and aims to assess a wide range of skills developed through students completing different types of tasks that often require the application of high-order skills according to Bloom's Taxonomy.

Having analyzed the results of PISA – 2018, PISA – 2022 and the analytical report on the exam results of external summative assessment of 12th grade students of Nazarbayev Intellectual Schools AS-/A-Level (Center for pedagogical measurements, 2022: 72) , it was determined that the content and applied skills in the task are very similar. According to the surveys and the results of the completed works of students it was determined that the task containing information and visual organizers requires the use of high-order skills, as well as takes more time to complete. This led to the research questions, such as:

1. What is one way to help students apply high-order skills when performing the task of containing visual organizers?

2. What hints and tips should be given to teachers in improving international assessment results like PISA and AS-/A-Level?

Research methods

This study analyzed the results of PISA -2018, PISA -2022, as well as the results of exams on international standards AS-/A-Level (12th grade). In order to improve the quality of knowledge of students in grades 11-12 of the NIS (Nazarbayev Intellectual School) in Semey, various learning strategies were analyzed, including the CLIL methodology (Content and language integrated learning – an approach to studying content through an additional language (foreign or second)) (Coyle, 2010: 4) .

This study used specific CLIL strategies such as visual organizers to improve high order thinking skills, constructive feedback to support and self-reflection of the students.

The answers of 12 grades students under the international program for assessing the educational achievements of students were also studied. One notable characteristic of the PISA study is its emphasis on evaluating students' practical competence in applying theoretical knowledge and skills to real-life situations. It assesses their problem-solving abilities in contexts that extend beyond specific academic subjects or educational domains. The research tools are aimed at establishing the degree of formation of general educational skills in solving problems that students may encounter in life in order to function effectively in modern society.

These strategies improve students' understanding and application of higher-order skills for success in external examinations.

In order to improve the quality of knowledge of students in grades 11-12 at NIS (Nazarbayev Intellectual School) in Semey, various teaching strategies were analyzed, including the CLIL methodology (Content and Language Integrated Learning – an approach to learning content through an additional language (foreign or second language)) (Coyle, 2010: 4) . This study used specific CLIL strategies, such as the use of visual organizers in tasks to improvehigher-order thinking skills and examples of constructive feedback for student support and self-reflection. Responses of 12th grade students on the International Student Assessment Program and PISA tasks, which similarly include in their content the application of high-order skills, were also studied; usually these types of tasks are accompanied with visual organizers.

One of the notable features of the PISA study is the emphasis on assessing students' practical competence in applying theoretical knowledge and skills to real-life situations. It assesses their problem-solving abilities in contexts beyond specific academic subjects or educational areas. The survey instrument aims to establish the extent to which students have developed general education problem-solving skills that they may encounter in life to function effectively in modern society.

These strategies improve students' understanding and application of higher-order skills for success in external examinations.

Literature review

In the last few years, CLIL (Content and Language Integrated Learning) has become the keyword and hope of many educators and policy makers. From a desire to boost students' language skills without neglecting other relevant content and thereby meet the European Union's ambitious goal of making students proficient in two EU languages, CLIL has been introduced in a range of European countries. Subjects as diverse as History and Biology are already taught through the medium of a foreign language in many European

schools. The current trend goes hand-in-hand with the accrued attention paid to CLIL by educational researchers.

As CLIL (Content and Language Integrated Learning) continues to develop into a holistic approach to deep learning, its potential for providing motivating and creative contexts in which all learners can succeed continues to unfold (Coyle, 2015: 12-13) . David Marsh, a researcher at the University of Finland Jyvaskyla, coined the acronym CLIL in 1994 to describe the integration of foreign language teaching and subject content. The emergence of CLIL in Europe during that time was influenced by political and educational developments. Since then, CLIL has become the most widely used term in Europe for programs that combine language learning and subject matter. In 2005, Marsh proposed that CLIL encompass various methodologies focusing on thematic content and the target language. Over the past decade, CLIL research has gained momentum, attracting scholars from different fields such as linguistics, education, psychology, and neuroscience. Alongside language acquisition, the study of learning strategies and cognitive abilities has also become integral to CLIL objectives. In our country, the CLIL strategy has been successfully implemented in the NIS system since 2014, with many science teachers acquiring and refining their instructional methods. In a CLIL classroom, subject content is taught in English while adhering to the established curriculum. This integration of content and language learning aligns with the 4Cs Framework (Feddermann, 2022: 101578) .

Starting in the mid-1990s, the OECD initiated the planning of the Program for International Student Assessment, commonly known as PISA. The first round of PISA testing occurred in the early 2000s, with the results being published in December 2001. Over time, PISA results have gained recognition as a global benchmark for educational quality, leading to the globalization of educational policies, as highlighted by PISA director Andreas Schleicher in the provided quote. PISA assessments are designed to evaluate the reading, mathematics, and science literacy of 15-year-old students, along with a broader range of factors such as their interests, attitudes, and motivation. The focus of the assessment is on students' ability to apply their knowledge and skills to real-life situations, moving beyond a narrow emphasis on their mastery of specific school curricula. This approach is commonly referred to as 'literacy' (Canton, 2021: 677-687) .

Result and discussion

The publication of the PISA-2018 outcomes by the OECD marked the release of a worldwide study on the functional literacy of students aged 15. Kazakhstan's performance was far below the OECD countries and its own results in previous years. Over the past three years, there has been a decrease of 57 points in mathematics, 59 points in science, and 40 points in reading literacy. However, OECD PISA-2022 results, showed a slight increase: among 81 countries, Kazakhstan ranked 46th in math (54th in 2018), 61st in reading (69th in 2018), and 49th in science (69th in 2018) (Table 1).

This means that the results of Kazakhstani students show the level of functional literacy, that is, the extent to which students are able to apply the acquired knowledge in practice, think critically, draw valid conclusions, interpret information from graphs and charts, which shows low results in the course of study.

Table 1 – Results of PISA, Kazakhstan

Type of assessment	2012	2015	2018	2022
Mathematics	432	460	423	425
Natural science	425	456	397	423
Reading literacy	393	427	387	386

* In 2015, a PISA study was conducted in Kazakhstan, but its results were excluded from the OECD database because the data collection method, as it turned out, did not comply with the regulations.

According to the OECD PISA results from 2000 to 2022, Kazakhstan has never been in the top 20. School children in Kazakhstan scored below the OECD average in math, reading and science. However, if we compare the overall results of GS (general education schools) with NIS and individual NIS results, there is a significant difference (Table 2).

Table 2 – Results of PISA, GES (General education schools) and NIS (Nazarbayev intellectual schools)

Type of assessment	GES-2018 (General indicators)	NIS-2018 (separately taken indicators)	GES-2022 (General indicators)	NIS-2022 (separately taken indicators)
Mathematics	423	554	425	562
Natural science	397	526	423	536
Reading literacy	387	511	386	490

It should be noted that the use of CLIL technology, in particular as visual organizers and feedback in the practice of NIS is being successfully implemented. Consequently, the average score in mathematics is between the leading Singapore and second place Japan, and the average score in science is 536 points, which is comparable to Japan and Korea, which ranked second and third, respectively. Note that selecting visual organizers is one strategy that develops reading literacy, which includes data presentation like visual information (diagrams, tables, info graphics, pictures, maps).

Based on the results of the external examination for each subject, an analytical report is provided throughout the Nazarbayev Intellectual School network with detailed analysis, conclusions and recommendations, and an action plan for the further development of subjects. The methods were selected to improve the quality of knowledge that allow students to visually organize information, contributing to learning, since they allow students to capture educational content, helping the student to systematize and analyze information data more dynamically (Akcaoğlu, 2023: 101187) .

The bar chart 1 shows the comparative indicators of students of Intellectual schools in the subject "Biology" for three academic years. The data indicate a decrease in the average score at the end of 2021 and 2022, compared with 2019 by 22.3 (28.1%) and 1.8 (2.3%) points, respectively. The percentage of tasks completed in 2022 indicates a slight decrease in the results of students. Thus, compared to 2019 and 2021, the results of students decreased by 2 percent (Center for pedagogical measurements, 2022: 73) .

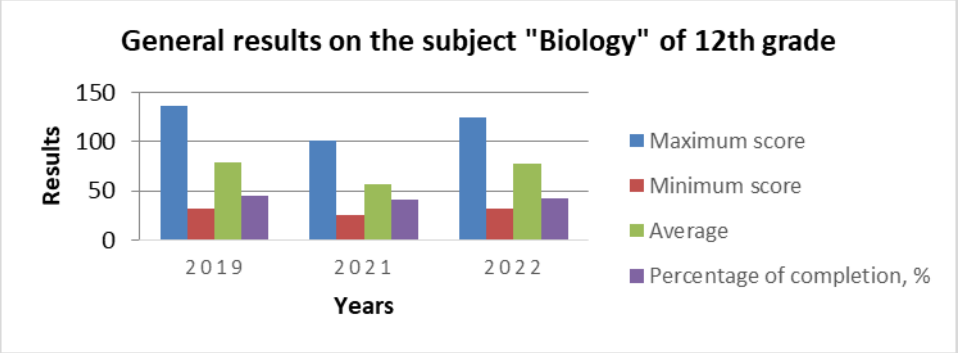


Diagram 1 – General results on the subject «Biology» of 12th grade students of the Nazarbayev Intellectual Schools network

The bar chart 2 illustrates the comparative indicators of Nazarbayev Intellectual Schools students in the subject of "Informatics" over the specified period. The average score increased by 18 percent compared to 2021. Whereas, the percentage of completion of tasks in 2022 indicates a decrease in the results of students. Thus, compared to 2021, the results of students decreased by 11 percentage points.

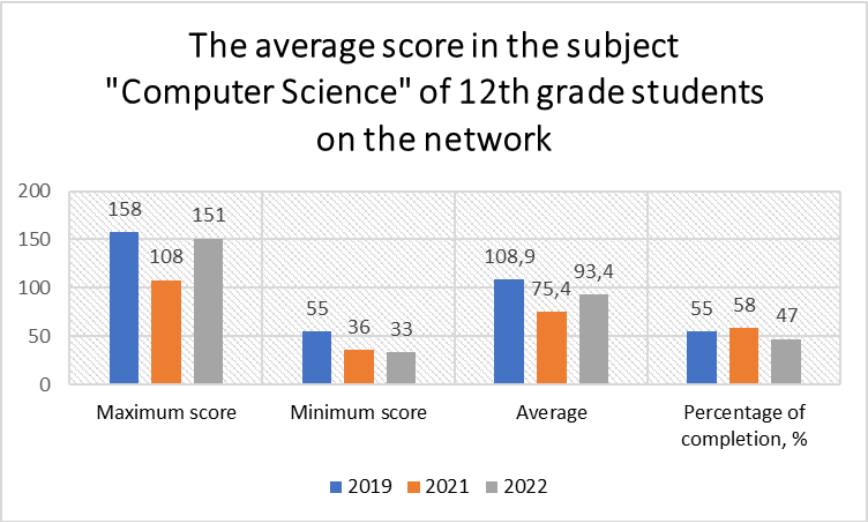


Diagram 2 – The average score in the subject "Informatics" of 12th grade students of the Nazarbayev Intellectual Schools network

Consequently, after analyzing the results of PISA and External summative assessment of NIS, we choose such strategy of constructive feedback in CLIL as scaffolding, when students write their formative assessment, summative assessment and practical works to support their understanding and guide to the right decision.

As well as using methods of visual organizers in reading literacy, we include tasks with higher order thinking skills on different types of assessment for increasing critical skills of the students.

For a more accurate reflection of the teacher with the students, constructive feedback was selected, like we mention before – this is a positive assessment that is provided to students to assist in finding solutions in problem areas. Accordingly, constructive feedback is positive and is used as an auxiliary means of communication to address specific issues or concerns.

The implementation of visual informative organizers in Kazakhstani educational systems aligns with the advancements in contemporary education. A visual organizer is learning and teaching tool that is used to organize information and ideas in a way that is easy to understand and digest. By combining text and visual elements, information task visualizations demonstrate relationships and connections between concepts, terms, and facts. Visual organizers can be used in all classrooms and have proven to be effective learning tools for gifted and special needs students.

Graphic organizers are tools that help us see and understand information better. They show the main ideas and details of a topic in a visual way, using labels and shapes. They help us organize and connect information in a clear and logical way. Many teachers (85%) in NIS in Semey use graphic organizers to help their students think critically and creatively in different subjects. Graphic organizers help students focus (McKnight, 2010: 7-14) by highlighting the key words and concepts, and how they relate to each other. They also help students think more deeply and creatively, by making them compare, evaluate, and draw conclusions. Graphic organizers make learning more active and fun for students. The following organizer (Bromley, 1999: 13-18) shows some specific benefits of graphic organizers for students and teachers. Constructive feedback is a way of giving helpful and positive comments to someone to help them improve (Wu, 2023: 102160) . It helps people learn from their mistakes and grow personally and professionally. Constructive feedback is

different from destructive feedback, which is negative and hurtful. Destructive feedback only points out the problems, without giving any suggestions or support (Chang, 2022: 104502) . The table 3 shows the difference between constructive and destructive feedback.

Table 3 – Comparison of constructive and destructive feedback

constructive feedback	destructive feedback
• supports motivation • increase interest to the subject • supports confidence • creates positive feeling of the subject • helps progress of the learning	• causes demotivation • creates frustration • damages confidence • creates negative feeling of the subject • impedes progress of the learning

Having analyzed the results of the students and the skills which teachers need to improve, we give tips below on how to make feedback informative and constructive as well as how to include graphic organizers in such field as reading literacy:

1. Draw students' attention to command words. What is the difference between the command verbs "describe" and "explain"? Constructive feedback should be related to the fact that you can see in the students' answers a lack of understanding of command words, so the researcher directs the student to clearly distinguish command verbs. Such as: Approve, distinguish, indicate, name, compare, etc. With the help of feedback, the student synthesizes the use of command words (task 1-2).

Task 1. *Designed feedback on tasks with command words in biology. (Sample from biology A level task).*

1. Students exposed a C_3 and C_4 plant to different CO_2 concentrations.

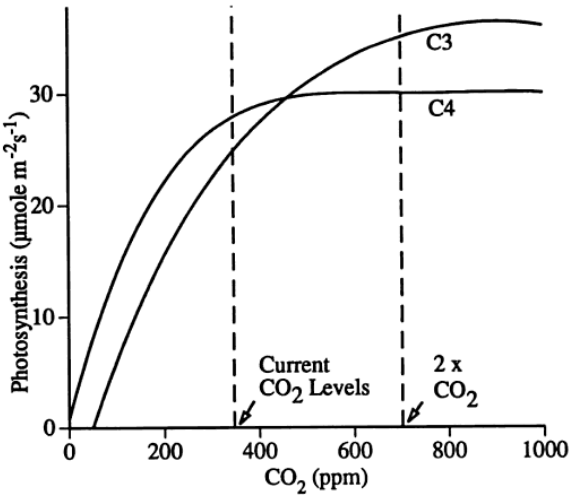


Figure 1 – Different between C_3 and C_4 plant of the CO_2 concentrations

ai. State at which CO_2 concentration did the rate of photosynthesis plateaued for:

C_3 ..... [1] C_4 ..... [1]

ii. When **comparing** the rate of photosynthesis between C_3 and C_4, **name** two factors that were kept constant by the students during their experiment.

.....

.....[2]

b. Discuss the difference in the rate of photosynthesis shown in **Figure 1** between C_3 and C_4.

.....

.....[4]

Using these command words, students should understand the use of different skills. For example, the command word **state, name** refers to the skills of knowledge and understanding, the category of low order thinking skills, and the command words **discuss, compare** consider high-order thinking skills according to Bloom's taxonomy: critical thinking and analysis on the given task. In this type of task when student make mistake in command words teacher can give feedback like how you understand LOTs and HOTs questions. Scaffold students to use table of skills list table or Bloom taxonomy illustration.

Task 2 Designed feedback on tasks with command words in computer science. (Sample from computer science A level task).

1. There is a data flow diagram for the system. **Complete** this diagram on numbers #1, #2, #4, #5. Then fully **analyze** including input, process, store and output data.

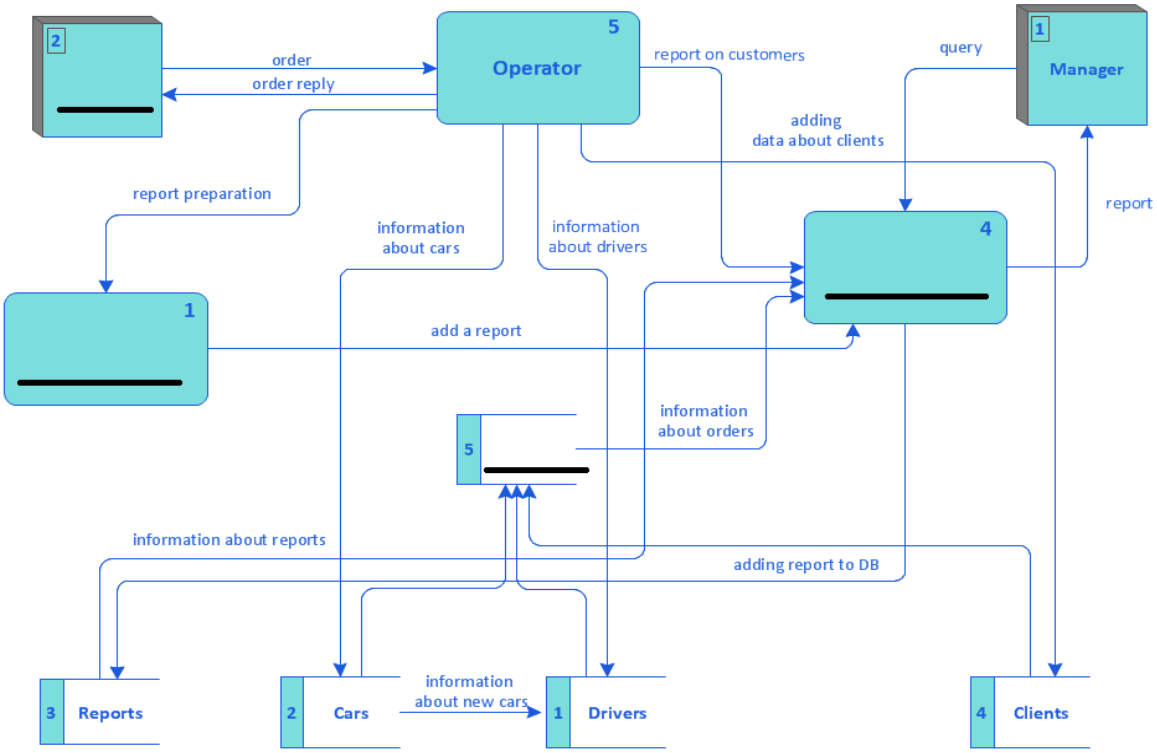


Figure 2 – The system of flow diagram (DFD)

Analysis DFD in **Figure 2**

.....
.....
.....
.....[5]

Using these command words like **complete** and **analyze** students should fully analyze Data flow Diagram scheme. Using key tips they can find key words on input, process, store and output data.

In this case, when a student makes a mistake in the diagram, the teacher gives constructive feedback on the analysis and synthesis of the diagram itself, and also pays attention to key points on verbs.

2. Task 3-4 will focus the studied personality on the development of functional mathematical literacy of students.

Constructive feedback should be related to the ability to find, organize and present information from various sources. This constructive feedback helps the teacher to form a versatile personality of students.

Task 3 Designed feedback on the development of functional mathematical literacy of students in computer science. (Sample from computer science A level task).

1. Kaspi bank is one of the fast growing banks in Kazakhstan. Recently the bank management de-

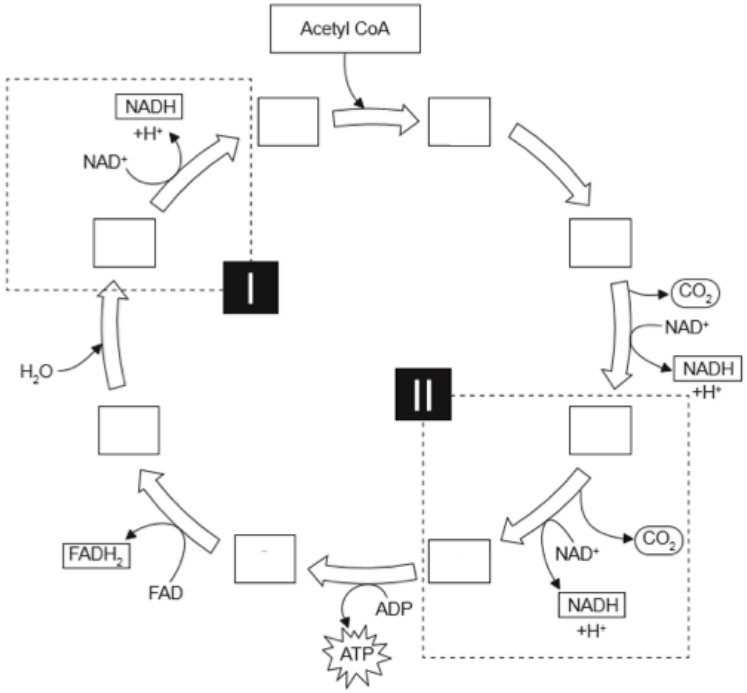
cided to promote the use of Kaspi bank payment by its customers. Payments for goods and services are done by scanning QR code or using bank debit cards. When registering for the account, the main details collected from new customers are phone numbers and customer names. According to the promotion, clients will receive 1000 tenge for every 15000 tenge paid more than last month using Kaspi account. A customer should not pay less 25000 tenge on Kaspi goods and services payments in order to qualify for the promotion award.

Draw a **flow chart** showing the above promotion process [6].

To acquire proficiency in mathematics and effectively communicate mathematical concepts, students must possess the skills to comprehend and accurately employ various elements, including notation, subject-specific language, conventions, and representations. These literate demands become crucial when constructing logical reasoning or mathematical arguments and when applying mathematics in diverse real-life contexts. It is essential to approach mathematical language with precision, as several terms used in mathematics may have different meanings compared to their everyday usage.

Task 4 Designed feedback on the development of functional mathematical literacy of students in biology. (Sample from biology A level task).

b. The Krebs cycle occurs in the mitochondrion. **Figure 3** outlines the steps of the Krebs cycle.



[Source: CAMPBELL, NEIL A.; REECE, JANE B., *BIOLOGY*, 7th, ©2005, p.68. Reprinted by permission of Pearson Education, Inc., New York, New York.]

Figure 3 – The steps of the Krebs cycle

i. With reference to **Figure 3**, ***distinguish*** between the processes that happen in I and II.

.....
.....[2]

ii. Calculate the number of **reduced electron carriers** that would be formed if 4 molecules of Acetyl CoA entered the Krebs Cycle.

.....
.....[1]

On such kind of tasks, the student must apply the skills of natural and mathematical literacy. Carefully examine the visual information graph for the correct answer. Enhancing students' mathematical literacy entails fostering their ability to establish connections among mathematical terminology, concepts, skills, and representations. This interconnectedness aids in the development of a comprehensive understanding of mathematics and promotes overall mathematical literacy.

Conclusion

This study suggests that the use of the visual organizers tool in assignments and the implementation of constructive feedback on students' responses by the teacher have a positive effect on understanding the content of assessment types. Students who are taught using these tools have shown better academic performance. The results of the international assessment and quarterly monitoring of grade 12, as well as the results of PISA – 2018, PISA -2022 in the comparison of NIS and visual organizers are good evidence that visual organizers promote the development of critical thinking, which requires the application of high-order skills in students, as well as a more meaningful approach to the perception of visual information. Based on the research questions and results, we have made the following recommendations:

1. Teachers should use the visual organizers tool in assignments when teaching biology, computer science and other basic sciences as it has been found to improve student performance and critical thinking;

2. Teachers are encouraged to use constructive feedback during the learning process as assessment, which encourages students to analyze their strengths and weaknesses;

3. It is recommended that the management of educational institutions encourage teachers to attend seminars and workshops organized to promote the use of new teaching strategies.

Әдебиеттер

1. Pulkkinen, J., & Juhani, R. The correspondence between PISA performance and school achievement in Finland // International Journal of Educational Research. – 2022. – № 114. С. 102000. https://doi.org/10.1016/j.ijer.2022.102000
2. OECD, PISA 2022 Results :The State of Learning and Equity in Education, PISA, OECD Publishing, Paris. – 2023. – № 1. https://doi.org/10.1787/53f23881-en.
3. OECD, PISA 2022 Results: Learning During – and From – Disruption, PISA, OECD Publishing, Paris. – 2023. – №2. https://doi.org/10.1787/a97db61c-en.
4. Филиал «Центр педагогических измерений» автономной организации образования «Назарбаев Интеллектуальные школы». Аналитический отчёт по результатам экзаменов внешнего суммативного оценивания учащихся 12 класса Назарбаев Интеллектуальных школ. – 2022. – С. 72-113.
5. Coyle, D., Hood, Ph., Marsh D. CLIL: Content and Language Integrated Learning. Cambridge University Press, 2010.
6. Coyle, D. Content and Language Integrated Learning Inspired by Drama Pedagogy. Cambridge University Press, 2015.
7. Feddermann, M., Jürgen B., Jens, M. Just selection and preparation? CLIL effects on second language learning. // Learning and Instruction. – 2022. – № 80. – С. 101578. https://doi.org/10.1016/j.learninstruc.2021.101578
8. Canton, H. Organisation for Economic Co-Operation and Development – OECD // The Europa Directory of International Organizations. Routledge. – 2021. – С. 677-687.
9. Akcaoğlu, M.Ö., Ezgi M., & Erkan K. The mediating role of metacognitive awareness in the relationship between critical thinking and self-regulation //Thinking Skills and Creativity. -2023. – №47. – С. 101187. https://doi.org/10.1016/j.tsc.2022.101187
10. Анализ результатов учащихся по итогам внешнего суммативного оценивания. Центр педагогических измерений. – 2022. – С. 73-140.
11. McKnight, K.S. The teacher's big book of graphic organizers: 100 reproducible organizers that help kids with reading, writing, and the content areas. Jossey-Bass. – 2010. – С. 7-14.
12. Bromley K., De Vitis L.I., Modlo M. 50 Graphic Organizers for Reading, Writing & More. Scholastic Professional Books. – 1999. – С. 13-18.
13. Wu Y., Schunn C.D. Passive, active, and constructive engagement with peer feedback: A revised model of learning from peer feedback // Contemporary Educational Psychology. – 2023. – №73. – С. 102160. https://doi.org/10.1016/j.cedpsych.2023.102160
14. Chang C.C., Hwang G.J. A structured reflection-based graphic organizer approach for professional training: A technology-supported AQSR approach // Computers & Education. – 2022. -№183. – С. 104502. https://doi.org/10.1016/j.compedu.2022.104502

References

Analiz rezul`tatov uchashhixsya po itogam vneshnego summativnogo ocenivaniya. (2022). Centr pedagogicheskix izmerenij. [Analysis of student results based on the results of external summative assessment. Center for Pedagogical Measurements]. Astana, CPI, 73-140.(in Russian)

Akcaoğlu, M.Ö., Ezgi M., & Erkan K. (2023). The mediating role of metacognitive awareness in the relationship between critical thinking and self-regulation. *Thinking Skills and Creativity,* 47, 101187. https://doi.org/10.1016/j.tsc.2022.101187

Bromley K., De Vitis L.I., & Modlo M. (1999). *50 Graphic Organizers for Reading, Writing & More.* Scholastic Professional Books, 13-18.

Canton, H. (2021). Organisation for Economic Co-Operation and Development – OECD. *The Europa Directory of International Organizations. Routledge*, 677-687.

Chang C.C., & Hwang G.J. (2022). A structured reflection-based graphic organizer approach for professional training: A technology-supported AQSR approach. *Computers & Education,* 183, 104502. https://doi.org/10.1016/j.compedu.2022.104502

Coyle, D. (2015). *Content and Language Integrated Learning Inspired by Drama Pedagogy.* Cambridge University Press.

Coyle, D., Hood, Ph., & Marsh D. (2010). *CLIL: Content and Language Integrated Learning.* Cambridge University Press.

Feddermann, M., Jürgen B., & Jens, M. (2022). Just selection and preparation? CLIL effects on second language learning. *Learning and Instruction,* 80, 101578. https://doi.org/10.1016/j.learninstruc.2021.101578

Filial «Centr pedagogicheskix izmerenij» avtonomnoj organizacii obrazovaniya «Nazarbaev Intellektual`ny`e shkoly`» (2022). Analiticheskij otchyot po rezul`tatam e`kzamenov vneshnego summativnogo ocenivaniya uchashhixsya 12 klassa Nazarbaev Intellektual`ny`x shkol. [Branch "Center for Pedagogical Measurements" of the autonomous educational organization "Nazarbayev Intellectual Schools". Analytical report on the results of external summative assessment exams for 12th grade students of Nazarbayev Intellectual Schools]. Astana, CPM, 72-113. (in Russian)

McKnight, K.S. (2010). *The teacher's big book of graphic organizers: 100 reproducible organizers that help kids with reading, writing, and the content areas.* Jossey-Bass, 7-14.

OECD (2023), PISA 2022 Results (Volume I): The State of Learning and Equity in Education, PISA, OECD Publishing, Paris, https://doi.org/10.1787/53f23881-en.

OECD (2023), PISA 2022 Results (Volume II): Learning During – and From – Disruption, PISA, OECD Publishing, Paris, https://doi.org/10.1787/a97db61c-en.

Pulkkinen, J., & Juhani, R. (2022). The correspondence between PISA performance and school achievement in Finland. *International Journal of Educational Research,* 114, 102000. https://doi.org/10.1016/j.ijer.2022.102000

Wu Y., & Schunn C.D. (2023). Passive, active, and constructive engagement with peer feedback: A revised model of learning from peer feedback. *Contemporary Educational Psychology*, 73, 102160. https://doi.org/10.1016/j.cedpsych.2023.102160

Авторлар туралы мәлімет:

Садыкова Айнур (корреспондент автор) – «Педагогика және психология» білім беру бағдарламасының докторанты, Alikhan Bokeikhan University (Семей қ., Қазақстан, e-mail:ainura_pulsativa@mail.ru)

Мынбаева Майгуль – мұғалім-сарапшы NIS информатика, Семей қаласындағы физика-математика бағытындағы Назарбаев Зияткерлік мектебі (Семей қ., Қазақстан, e-mail:mynbaeva_m@sm.nis.edu.kz)

Исмаилова Гульнара – PhD доктор, педагогика және писхология кафедрасының аға оқытушысы, Alikhan Bokeikhan University (Семей қ., Қазақстан, e-mail:gm-1978@mail.ru)

Искакова Маржан – п.ғ.к., PhD докторы, , педагогика және писхология кафедрасының деканы, Alikhan Bokeikhan University (Семей қ., Қазақстан, e-mail:maris1976@mail.ru)

Нуртазина Жанар – "Химия" білім беру бағдарламасының докторанты, Шәкәрім атындағы университет (Семей, Қазақстан), мұғалім-сарапшы NIS, Семей қаласындағы физика-математика бағытындағы Назарбаев Зияткерлік мектебі (Семей қ., Қазақстан, e-mail:nurtazina830912@gmail.com)

Information about authors:

Sadykova Ainur (corresponding author) – doctoral student educational program «Pedagogy and psychology», Alikhan Bokeikhan University (Semey, Kazakhstan, e-mail:: ainura_pulsativa@mail.ru)

Mynbayeva Maigyl – expert-teacher NIS, Nazarbayev Intellectual school of Physics and Mathematics in Semey (Semey, Kazakhstan, e-mail:: mynbaeva_m@sm.nis.edu.kz)

Ismailova Gulnara – PhD, Senior Lecturer of the department of pedagogy and psychology, Alikhan Bokeikhan University (Semey, Kazakhstan, e-mail:: gm-1978@mail.ru)

Iskakova Marzhan – c.p.s, PhD, dean of the department of pedagogy and psychology, Alikhan Bokeikhan University, (Semey, Kazakhstan, e-mail:: maris1976@mail.ru)

Nurtazina Zhanar – doctoral student educational program "Chemistry", Shakarim University, (Semey, Kazakhstan), expert-teacher NIS, Nazarbayev Intellectual school of Physics and Mathematics in Semey (Semey, Kazakhstan, e-mail: nurtazina830912@gmail.com)

Сведения об авторах:

Садыкова Айнур (корреспондентный автор) – докторант образовательной программы «Педагогика и психология», Alikhan Bokeikhan University (г.Семей, Казахстан, e-mail: ainura_pulsativa@mail.ru)

Мынбаева Майгул – учитель-эксперт NIS информатики Назарбаев Интеллектуальной школы физико-математического направления (г.Семей, Казахстан, e-mail: mynbaeva_m@sm.nis.edu.kz)

Исмаилова Гульнара – PhD доктор, страший преподователь кафедры педагогики и психологии, Alikhan Bokeikhan University (г.Семей, Казахстан, e-mail: gm-1978@mail.ru)

Искакова Маржан – к.п.н., PhD доктор, декан кафедры педагогики и психологии, Alikhan Bokeikhan University (г.Семей, Казахстан, e-mail: maris1976@mail.ru)

Нуртазина Жанар – докторант образовательной программы "химия", Университет имени Шакарима (г.Семей, Казахстан), учитель-эксперт NIS химии Назарбаев Интеллектуальной школы физико-математического направления г.Семей (г.Семей, Казахстан, e-mail: nurtazina830912@gmail.com)

Received 28.07.2023
Accepted 01.09.2024