Bricolage as an Alternative Way of Solving Educational Problems

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Abstract

The article considers the problems of modern education, innovative teaching methods, with the description of their practical application in the world and domestic pedagogical practice. Theoretical and practical aspects of bricolage as an alternative approach to education are studied in detail. It offers practical study of the subject by means of non-standard use of various materials with the use of previously created objects as resources for new projects. Characteristic features of bricolage as an innovative teaching method and a step-by-step description of the process of its practical realization on the basis of the conducted experiment on the creation of a distance learning course Bricolage course on the basis of Google Class online service: "By teaching we learn". The conducted experiment is an attempt to optimize the process of teaching English to 6th grade pupils of a comprehensive school on the basis of joint use of information technologies and bricolage as an alternative approach to education. Statistical analysis and evaluation of the experimental data through the application of series of dynamics was carried out. The results obtained at the end of the experiment allow us to speak about its success and justify the choice of the experiment model, in which the parents of students were the instrument of bricolage.

Keywords: bricolage, alternative approaches to education, innovative pedagogical methods, Google classroom, statistical analysis.

1. Introduction

In today's world, the use of digital information technologies in all areas of human endeavor is rapidly increasing. Among the most widespread technologies, it is worth mentioning the involvement of artificial intelligence (Ignatiev et al., 2019; Zakharov et al., 2022), machine learning (Filippov et al., 2022) and neural network technologies (Zemenkova et al., 2022), artificial intelligence systems exemplified by large language models LLMs such as GPT generated, LLama and others. The field of education is no exception, the limiting factors here are often the requirements for significant energy and infra-structural resources, not always available to institutions of higher education. Since the use of all kinds of smartphones and other gadgets among young people has become widely spread, the use of simplified models of intelligent digital learning technologies and small language models SLM (Borisova et al., 2021; Libing Wang, Tiachong Wang, 2024) will be more widespread.

Currently, there are problems in the field of education, for the solution of which traditional ways of organizing the educational process are not suitable, their successful overcoming is seen

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from the position of supplementing the existing educational system with alternative methods of education (Kharlamova et al., 2023; Potapova et al., 2023; Vinogradova et al., 2021).

Thus, one of the innovative educational trends is bricolage (Elsukov, 2012; Meirovitz et al., 2022; Varlakova et al., 2023). The use of this method of teaching allows the teacher to approach the creation of a new projectcreatively, using exactly what he or she needs, because this method does not require and does not imply the availability of ready-made methodological recommendations and authorizations of guidance. Instead, the teacher and learners can use available media technologies, materials and tools that were not originally intended for educational needs in an attempt to present their students with a new method of learning, replacing the routine learning process with more active entertainment activities.

The relevance of this article is due to the presence of a number of problems in modern education, the solution of which is seen, among other things, by filling the pedagogical practice with non-traditional ways and methods of organizing the educational process and greater involvement of information technologies (Korelskaya et al., 2021; Ovchinnikova et al., 2023; Shestakova, Morgunov, 2023).

In the conditions of ever-increasing educational load on students and insufficient time allocated in general education institutions for mastering and consolidation of knowledge, the methods of teaching, which involve providing students with the opportunity to independently study additional lecture material at a convenient time for them, are becoming increasingly important (Clement, Miles 2017; Gerasimova et al., 2022; Saba, 2003).

The object of the study is alternative innovative forms of teaching that involve modern information technologies.

The subject of the study is the use of one of the modern pedagogical innovations – bricolage.

The purpose of this work is to identify and study the features of the organization of the learning process when using bricolage as an innovative pedagogical method.

To achieve this goal, it is proposed to solve the following tasks:

To analyze the current state of the educational process in the information society.

To consider the theoretical basis and prerequisites for the emergence of bricolage as an alternative way of solving educational problems.

To study examples of practical use of bricolage in foreign and domestic pedagogical practice.

To develop and implement an educational course meeting the principles of bricolage on the basis of free Internet service Google Class.

2. Materials and methods

The analysis of the current state of the educational process in the information society

Modern approach to the learning process involves the formation of information interaction between a teacher and students and the development of skills and abilities of the latter to independently orient in a large volume of information and the formation of students' non-standard creative thinking. The main goal of the teacher's innovative activity becomes a qualitative change in the personality of the student with a great emphasis on creating conditions for self-motivation and self-education of the student.

The authors of works (Ferguson et al., 2019; Sharples et al., 2014) emphasize the following ten pedagogical innovations:

– Massive open social learning (Massive open social learning);
– Learning design informed by analytics (Learning design informed by analytics);
– Flipped classroom;
– BYOD (Bring-your-own-devices);
– Learning to learn;
– Dynamic assessment;
– Event-based learning;
– Learning through storytelling;
– Threshold concepts;
– Bricolage.

Let us analyze the listed innovative teaching methods. It should be noted at once that the Massive open social learning method (Hill, 2015) is based on the use of well-known MOOCs (Massive Open Online Courses) and social networks to engage learners in the educational process.

Massive open online courses (MOOCs), social games and quizzes are the main tools of engagement. The peculiarities of this approach are that learners meet only online and for short periods of time.

Learning design informed by analytics is often used to develop courses and lesson series and uses data analytics to create a coherent sequence of pedagogical tools and technologies (Mangaroska et al., 2020). The analytical approach used in the creation of methods contributes to the development of successful learning and teaching.

When using the Flipped classroom method, learners are engaged independently. Only tasks and exercises are discussed in detail with the teacher (Papadakis et al., 2019). The value of this method lies in the possibility to use lesson time for group activities, where learners can discuss the content of the lecture, check and supplement their knowledge, as well as devote more time to practical activities.

Bring-your-own-devices (BYOD, known in Russia as mobile learning) method of learning gives preference to smart phones or other modern gadgets with a specific training program in applications available to learners for classroom and home learning. The main advantage of BYOD is that the learning process may not be tied to a permanent stay in an educational institution, learners remain involved in the learning process even outside the institution (Ignashchuk et al., 2015).

Let us note the method of meta-learning (Learning to learn), which allows learners to acquire knowledge in a certain area in an easy and accessible form (Thrun et al., 2012). The essence of the method is self-education based on the use of online resources via the Internet. In order to achieve results, the method provides an opportunity to manage the process of knowledge acquisition through setting specific goals.

Stimulus assessment (Dynamic assessment) as a teaching method focuses on the evaluation of students' progress and achievements (Le et al., 2023). The essence of this method is to compare the results of one and the same student at different stages, which allows to take into account the individual characteristics of students and stimulate the desire for development.

The use of different types of thematic events (exhibitions, holidays, festivals) to involve students in the educational process suggests the method of event-based learning (Jurascheka et al., 2020) (Event-based learning). The advantage of this method is the involvement, personal interest and responsibility of each participant for their contribution to the common project and, as a consequence, to their education.

The method consists in the development of logically structured and effectively presented lecture material Learning through storytelling method (Bartan, 2020), involves writing stories that develop imagination, logic of thinking and, in general, the cultural component of the learner.

Involving certain background knowledge of learners to build an optimal learning process refers to the Threshold concepts method (Stopford, 2021). The challenging aspect of threshold concepts is that they often seem strange and unpredictable, and yet there is a growing interest in using threshold knowledge for subsequent successful learning in various disciplines.

Bricolage (Blankenship, 2020), which closes the list of the presented above methods, involves, according to the translation, reworking and using existing knowledge and constructs as resources for building new knowledge and projects. The method can be used for designing creative innovations and generating new ideas. It can be guided in organizing the interaction of relevant groups of people in order to implement innovative models in practice.

Bricolage takes the tenth places in the considered list, but it does not mean its last place in terms of its capabilities. The method, having as its main feature the ability to transform and adapt any available materials and practices for its own benefit, can easily use any of the above mentioned list of teaching methods as one of the components of its integrated approach to learning.

The considered educational methods show a variety of possible forms and methods of organizing the educational process that differ from the traditional approach.

The Czech multimedia project "Receptář (The Book of Prescriptions)" projects and know-how, is one of the examples of practical application of alternative teaching methods in foreign countries. Its main purpose is to organize the exchange of modern ideas This project is a full-fledged implementation of the bricolage learning method.

Another example of integrated application of such alternative learning methods as bricolage and BYOD, or mobile learning, is the South African project "Yoza Cellphone Stories", which consists of the use of mobile phones and BYOD (UNESCO-Fazheng, 2019), which consists of using young people's cell phones. The main goal of the Yoza Cellphone Stories project is to provide young

people with access to reading fiction by distributing it on their cell phones. This project creates a new community of readers and addresses the problem of insufficient supply of printed books.

A Russian example of using the bricolage approach to create multimedia products is the "Smeshariki" series. It combines a number of short stories aimed at a multi-age audience. The series was created as part of the educational project "The World Without Violence" with the support of the Ministry of Culture of the Russian Federation. The project is designed not only for children's audience. The stories are interesting for both children and adults. The series is in demand only in Russia, now it is broadcast in 60 countries and translated into 15 languages (Karpova, 2020).

The modern approach to the learning process implies the formation of information interaction between teachers and students, the development of the latter's skills and abilities to navigate a large volume of information and the formation of non-standard creative thinking of students.

The use of various media (Internet, television, social networks, etc.) by students presupposes their mastery of basic aspects of media literacy. Namely:
– Ability to interact with different types of media;
– A critical approach to the information provided;
– The ability to assess the reliability of its content;
– Taking into account copyright law and media economics.

These aspects are to be taken into account and monitored by the teacher.

Thus, the considered innovative methods of organizing educational and cultural projects, successfully implemented both in our country and abroad, clearly demonstrate changes in the traditional approach to the learning process, their active supplementation with modern alternative approaches.

Bricolage as an alternative way of solving educational problems

Let us consider examples of using the concept of bricolage in education. The terms "bricolage" and "bricoleur" in relation to processes in science and art were firstly used by French philosopher, ethnologist and culturologist Claude Lévi-Strauss. In his work (Galieva, Ibragimova, 2017), bricolage is defined as a form of activity that can be speculatively called "primary" rather than primitive science. According to C. Lévi-Strauss, a bricoleur can be defined as someone who creates a new thing by himself, independently, using available improvised means as opposed to the means used by a specialist. Each separate element can simultaneously reproduce a whole set of relations, both concrete and potential. In this case, all elements act as operators, suitable for any single-type operations.

When developing a training course in relation to the way of practical realization of bricolage as an alternative educational approach, we will adhere to the point of view of C. Lévi-Strauss, which implies the cumulative use of available and newly invented means and techniques, rather than opposing them to each other.

As follows from the previous considerations, the term "bricolage" defines a creative approach to working with any improvised means and materials. There are two known ways of using bricolage in pedagogy.

The first approach involves enabling individuals to create using improvised materials. Through the process of bricolage, both the learner and the materials are transformed through the use of imagination: a carpet becomes a rushing stream, sofa cushions become boulders, and children see themselves as explorers and discoverers, adopting various roles. At the same time, participants — particularly children — find enjoyment in the learning process by engaging in creative activities with a diverse range of objects, which they can modify and combine in any way they choose. This promotes sensory awareness of the shapes, properties, and qualities of various materials and their potential uses. Such experiences can be valuable for fostering creativity in a range of professional fields, from entry-level positions to specialist and managerial roles.

The second approach to integrating bricolage in education centers on fostering innovation and exploring new methods and technologies. The digitalization of educational resources, the proliferation of smartphone applications, and their growing use in the learning process have facilitated the rise of interactive classrooms. Physical attendance at classes and meetings is no longer essential for learning. A notable example of an alternative educational model that incorporates bricolage principles is the use of cloud storage via the Internet. In this scenario, the entire repository of information—shared files, curated materials on specific topics, discussions

of ideas, and more — can be stored in publicly accessible platforms (EDUTECH, 2014), such as Yandex Disk or Google Drive, allowing learners to access resources as needed.

The results of the 2014 Indian researchers' analysis of the use of pedagogical innovations (Sickel, Witzig 2016) show that educational programs created using cloud-based technologies rank 5 out of 10. The leading position in the analysis of Indian researchers is occupied by the method of learning based on the flipped classroom, and the same method is one of the first mentioned in this article.

Let's consider the process of creating an educational course based on the Google Classroom online service, which is integrated with Google Drive, Google Docs, Gmail and YouTube services.

Developing an online educational course based on bricolage principles

The experiment was conducted to optimize the educational process of teaching English to secondary school students using information technology and bricolage as an alternative approach to learning. The conducted experiment is based on two key elements that meet the stated requirements:

1. The experiment is conducted on the basis of Google Class Internet service.

2. The tool of bricolage as an alternative approach to learning is parents of schoolchildren who participate in the experiment together with their children.

At present, Google Class (Google Class Support, 2022) is a convenient and accessible way for students and teachers to communicate at a new level - now it is not limited by the limits of the classroom and strictly designated time of the class. Google Class allows teachers to create classes and add students, invite teachers to jointly teach a course, send assignments to students, organize thematic discussions, individual lessons, etc. In turn, students can receive assignments and submit completed work through the service, complete assignments online in Google Docs, comment and create entries in a shared news feed, etc.

All created documents are saved on Google Drive, which allows them to be available to both teachers and students at any time, eliminating the need to provide voluminous printed materials. The teacher can monitor the list of completed work in real time, check assignments, assign grades, and send the checked work to the student with a comment if it is necessary.

In this paper, the use of bricolage as an alternative way of solving educational problems is presented as an experiment to optimize the educational process. In order to comply with the basic principle of bricolage (using available resources and means in a non-standard way), we will use Google Classroom service to create a Bricolage course: "By teaching we learn", aimed at distance learning English for students in addition to the general educational program in order to repeat and consolidate students' knowledge by teaching parents, i.e. using parents as a bricolage tool, see Figure 1.
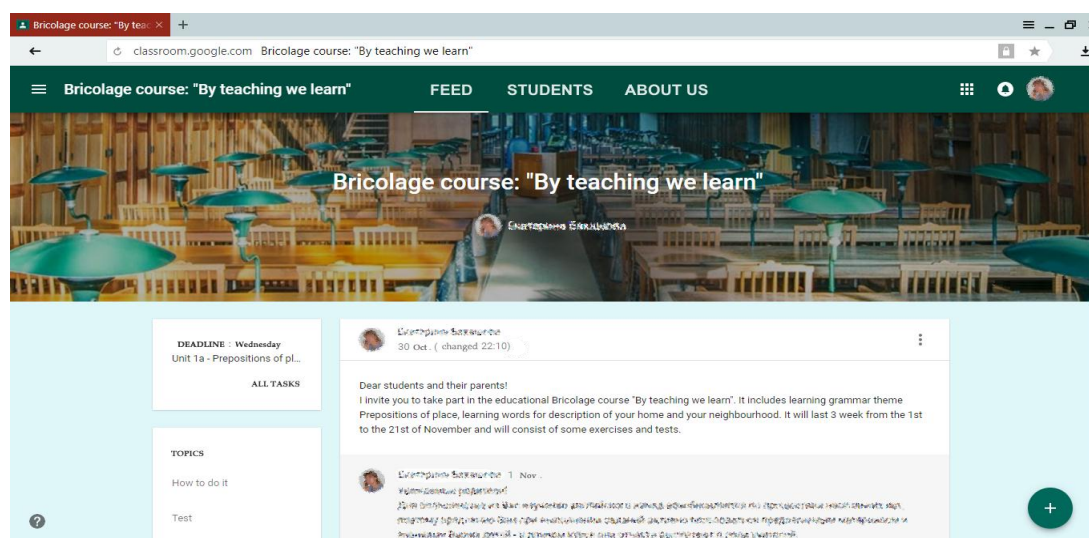
Fig. 1. Start page of the Bricolage course "By teaching we learn"

The Bricolage course: "By teaching we learn" involves pupils and their parents learning together the grammar and vocabulary material provided, with pupils acting partly as teachers,

as they are tasked with explaining to parents the grammatical rules of the topic and supervising the learning of the vocabulary. Thus, the aim of Bricolage course is:

1. To Involve parents in the process of learning English as children's learners, i.e. using them as a bricolage tool.

2. To revise and consolidate students' knowledge, skills and practice by explaining the material learned to their parents.

3. To increase the students' interest in learning English, their personal responsibility for achieving positive personal results and successfully implement joint activities with their parents.

The Bricolage course "By teaching we learn" was successfully conducted in a class of 14 students (7 students and 7 parents) from November 1 to November 21, 2023. In three consecutive lessons, participants were taught the topics "Prepositions of place" and "Description of my home and my neighborhood", see Figures 2, a) and b).

Exercise 2.
Look at the picture and answer the questions. Use the prepositions: *in, behind, under, between, next to, on.*

Where is the woman?
She is ___ *in* ___ the house.
1. Where's the man?
   He's _____ the window.
2. Where is the horse?
   It is _____ the man.
3. Where are the trees?
   They're _____ the house.
4. Where's the rabbit?
   It's _____ the trees.
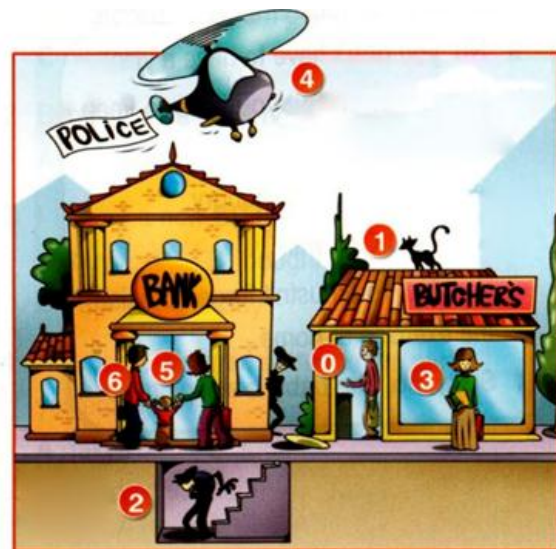5. Where is the cat?
   It is _____ the roof.

**Fig. 2a.** An example of an exercise on the topic "Prepositions of place"

Exercise 3.
Look at the picture and number the phrases.

	0	in the butcher's
A		next to the boy
B		under the bank
C		on the butcher's
D		between the woman and the man
E		in front of the butcher's
F		above the bank

Fig. 2b. An example of an exercise on the topic "Description of my home and my neighborhood"

The course also contains introductory and final tests, see Figure 3.
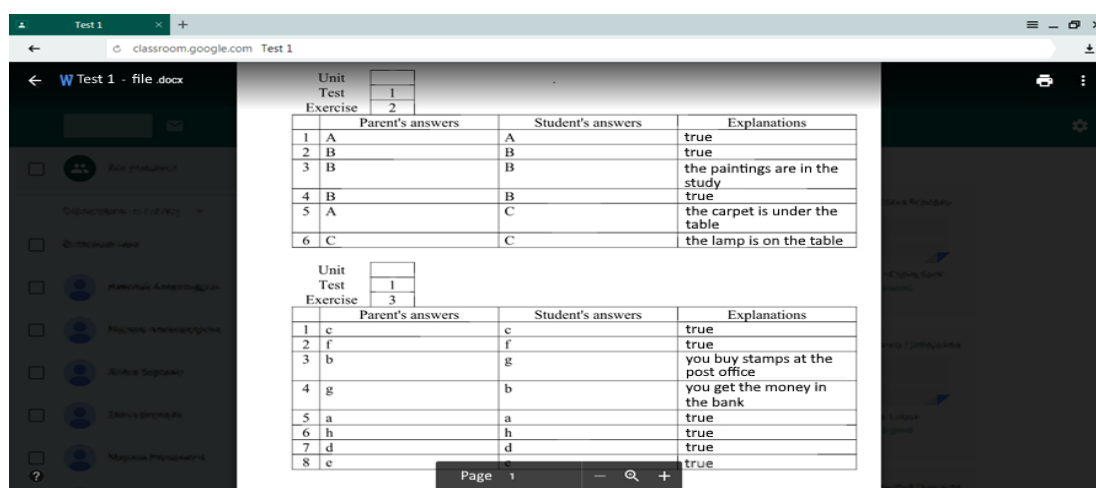
Fig. 3. Example of the completed form of answers to tasks from Test 1

We would like to emphasize the advantages of the ability to identify participants by their personal Google account – the last name and first name of the participant are automatically displayed in the lists of course participants. However, in order not to disclose personal information, their First and Last names are identified, for example, Student A / Parent A.

When performing some tasks, students had difficulties in explaining the material to their parents; in such cases, they turned to the course leader for help and clarification. This allowed the students to get timely answers to controversial questions and feel the teacher's support even in the conditions of online learning (Dorofeev, Korchagina, 2023).

When completing the tasks, both parents and pupils were responsible and attentive to the materials offered to them for study. When they received back work that had been graded low due to errors in their answers, participants had the opportunity to resubmit the answer form, if time permitted, before the deadline to improve their final score.

In some works of the course participants in addition to written answers, video recordings of their dialogs were also presented.

All participants of the Bricolage course: "By teaching we learn" met the stated deadline for completing the tasks of the final test. The results of completing the tasks, including introductory, intermediate and final tests, by the participants of the Bricolage course: "By teaching we learn" are reflected in Table 1.

Table 1. Results of completing the tasks of the Bricolage course: "By teaching we learn"

Bricolage course: "By teaching we learn"	Overall result	04.11	08.11	13.11	17.11	21.11
Participants of the educational course		Test 1	Unit 1a	Unit 1b	Unit 1c	Test 2
Student E	99,2	100	100	96	100	100
Student A	92,8	86	91	100	93	94
Parent A	76,0	67	64	74	86	89
Student B	91,8	86	100	83	93	97
Parent B	81,6	67	73	83	93	92
Student C	89,6	90	91	96	79	92
Parent C	86,6	90	91	91	75	86
Student D	99,2	100	100	96	100	100
Parent D	97,8	100	100	96	93	100
Parent E	92,8	90	91	87	96	100
Student F	98,2	100	91	100	100	100
Parent F	97,4	100	91	96	100	100
Parent G	68,0	52	64	78	71	75
Student G	84,4	57	91	91	89	94
Class average grade	89,67	84,64	88,43	90,5	90,57	94,21

During the course participants' performance on the sequential assignments, their results were predominantly positive, with growth and maintenance of high scores for both individual course participants and the class as a whole, see Figures 4, a) and b).
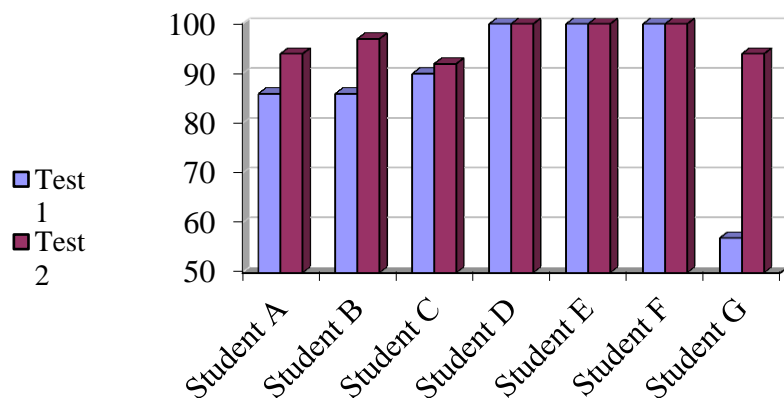
Fig. 4a. Dynamics of grades of pupils – participants of the Bricolage course: "By teaching we learn" for completed tests
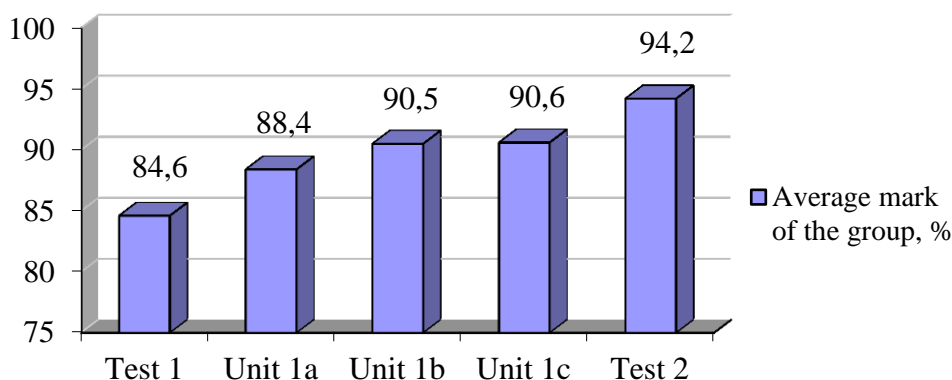
Fig. 4b. Dynamics of average grade by class of Bricolage course: "By teaching we learn"

3. Discussion and Results

The empirical data obtained during the experiment were analyzed using statistical analysis (Rock, 2016; Batkovskiy, 2020), see Table 2.

Table 2. Analysis of the dynamics of academic performance of the group of participants of the online course "By teaching we learn"

Stages	Average score	Absolute growth		Growth factor		Growth rate	
		Chain	Basic	Chain	Basic	Chain	Basic
0	84,64	—	—	—	1.00	—	100
1	88,43	3,79	3,79	1,04	1,04	104	104
2	90,5	2,07	5,86	1,02	1,07	102	107
3	90,57	0,07	5,93	1	1,07	100	107
4	94,21	3,64	9,57	1,04	1,11	104	111

In order to evaluate and analyze the dynamics of academic performance of the participants of the online course "By teaching we learn", we will use series of dynamics. These series contain two types of statistical indicators.

1. Time moments (introductory testing stage, intermediate testing stages, final testing stage).

2. Indicators of the levels of the series. Since the methodology of analyzing series of dynamics allows expressing their levels equally as absolute values and relative indicators or average values, we use the average sum of scores for the whole group, obtained for each stage of testing, rather than for each participant of the course separately, as indicators of the levels of the series.

The following requirements were taken into account in the process of constructing the series of dynamics:

– All indicators of the dynamics series are reliable; comparable in time; comparable in content;

– All indicators of the dynamics series are given in the same units of measurement.

Absolute growths show by how many units the subsequent level of the series has changed compared to the previous one – chain absolute growths (1) or compared to the initial level – base absolute growths (2).

$$\Delta y^c = y_i - y_{i-1}, \tag{1}$$
$$\Delta y^b = y_i - y_0, \tag{2}$$

where Δy - absolute growth (Δy^c - chain, Δy^b - base),

y_i −level of the series for the current period,

y_{i-1} −level of the series of the previous period,

y_0 − initial level of the series.

The increase in absolute growth indicates that the average performance of the group has increased at each successive stage of testing.

The growth coefficient shows how many times the level of the series has changed compared to the previous one – chain growth coefficients (3) or compared to the initial level - base growth coefficients (4).

$$K_g^c = \frac{y_i}{y_{i-1}}, \tag{3}$$
$$K_g^b = \frac{y_i}{y_0}, \tag{4}$$

The growth rate shows the number of percentages of the next level of the series compared to the previous one – chain growth rate (5) or compared to the initial level - base growth rate (6).

$$R_g^c = \frac{y_i}{y_{i-1}} \times 100\%, \tag{5}$$
$$R_g^b = \frac{y_i}{y_0} \times 100\%, \tag{6}$$

The presented results of statistical analysis clearly demonstrate the growth of pupils' performance in the process of jointly mastering grammatical and lexical material on a given topic with their parents. The positive effect on the growth of pupils' interest in the learning process organized with the use of bricolage as an alternative pedagogical method and, as a consequence, the increase in the level of knowledge acquisition was also due to the fact that pupils, acting partly in the role of a teacher, found themselves in an unfamiliar but rather responsible situation, when parents perceived them as more knowledgeable and listened to their recommendations when performing tasks. Pupils' consistent study of the provided information in the proposed form allows them to gradually accumulate knowledge and develop practical skills of applying the acquired knowledge.

3. Conclusion

The presented results of the consecutive solution of the tasks set by the research allowed us to confirm the main features and principles of bricolage organization as an innovative teaching principle.

Bricolage, considered in this article, as one of the innovative pedagogical methods is a rather interesting and effective way of learning.

The hypothesis about the usefulness of attracting alternative methods of learning in addition to traditional ways of organizing the educational process in order to successfully overcome the problems that currently exist in the field of education is confirmed.

As the next stage in the study of bricolage as an alternative method of learning to help solve existing educational problems, we can propose an experiment similar to the conducted one, but in which the instrument of bricolage will be junior school students.

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