About Electronic Textbook "Mathematical Tasks Programming. First Steps"

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Abstract

The goal of knowledge quality improving of secondary school students in the field of exact sciences determines the relevance of creating interactive electronic educational resources for tasks solving of mathematical models programming. The paper presents the electronic textbook description, its content and structure, model, as well as design and software development technology. It is intended to improve qualitatively the preparation of high school students and junior university students in mathematics and programming. In particular, it can be used as a textbook at elective classes and young programmers' clubs, as well as in the process of individual work to train schoolchildren and students for programming Olympiads.

The content of the electronic textbook is based on a set of mathematical tasks. Each task contains a statement of the task, instructions for its solution and an algorithm for solving it, implemented in the form of program code in Pascal, C/C+ and Python.

The model of learning system using an electronic training manual is described. The e-tutorial software is a Web application and is built on client-server architecture. The basis of the Web-application is the "Textbook" software module, which contains a complex of mathematical tasks with the author's algorithms of solving. The web application contains a software module for expanding the electronic textbook content in the form of a built-in editor for mathematical tasks. A qualified user of the system has the opportunity to develop new tasks within the existing textbook format with a description of the algorithm for their solution. The automatic system of checking the proposed algorithm for task solving provides the basis for an expert opinion on placing a new task in the library for further use.

The approbation of the Web-application in the educational process was carried out in secondary educational institutions of Kherson, and it received a positive assessment from students and teachers.

Keywords

STEM education, electronic textbook, schoolchildren, students, mathematics, algorithmization, programming.

1. Introduction

Modern period of social developing is characterized as era of wide spreading of informational technologies (IT) in every part of human activity. The actual problem is IT-specialist training. That is why, in the document of the Ministry of Education and Science of Ukraine, the Draft Concept of STEM Education in Ukraine, it is noted:

"A critical factor in the innovative production of the developed state is, from one side, the progressively growing deficit of high-tech experts, who are able to a complex scientific and engineering activity, and from the other side, decreasing the student's interest to study natural-mathematical

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disciplines. Their knowledge is put in modern technologies of industrial development and directing: from technology to social and economic processes".

The document holds complete critical analysis of situations that may take place during teaching nature and IT disciplines at high schools, also concepts on how to improve student's education in this sphere. The document says:

"STEM – oriented educational method is one the most important ways of developing nature and math studies. Acronym STEM determines special features of didactics, which idea can be found out by mixing multidisciplinary practice oriented approaches for studying nature and math disciplines".

Leading specialists in the field of IT and IT education note that the current level of IT development is increasingly using complex tools for automating the design of software systems. So, in the near future, we should expect an increase in the number of specialists employed at the stage of mathematical and information modeling of software systems, and a significant decrease in the number of specialists employed at the stages of coding and testing.

On the other side, in Ukraine there are many courses, "schools", "academies", whose specialization is to prepare human resource in short period of time by studying the most actual problems of IT sphere now but at the same time ignoring basic aspects.

The young men who have finished such educational centers can code in specific technologies and are not prepared for mathematical modeling or new CASE-technologies. Unfortunately, most software developing companies prefer such way, that allows them to teach one-way-programmers fast and cheap.

Concept of STEM-education offers modern educational approach that puts basic preparing aspects that can harmonically combine with applications at the top.

The electronic training manual (ETM), mentioned in the paper, combines both mathematical and programming preparing, as planned by the developers. It's main target is to improve pupils' and students' education in math and programming sphere. It can be used as manual on election courses and extra courses of young programmers, also while preparing students for Olympics programming during individual work.

The survey of scientific and educational literature shows that market has a lot of teaching books and programming textbooks for students and pupils. Paper books are well represented as well as their Internet variants. We are interested in electronic and paper formats that have tasks of Olympics level along with their solving and code lines, also thematic manuals in algorithmization and programming. We'll inspect mathematical tasks more thoroughly.

1. First of all, we'll mention the books, that are part of golden fond of scientific and educational literature. Algorithm Encyclopedia of D. Knuth in 7 volumes, where we want to mention the first two volumes [1],[2] , educational monograph of E. Dijkstra [3], the book of J. Bentley [4], unique book [5] dedicated to mathematical basics of computer science, also N. Wirth books and other classics. From recently published, we want to mention the book [6].
2. According to its content, the ETM, is an elementary introduction to computer mathematics. The theoretical aspects of such a branch of science as computer algebra are systematically presented in [7]-[9]. There are many books in the most popular computer algebra systems, such as MathematicaTM, MapleTM, MathcadTM [10]- [12]. Each computer algebra system contains a wide range of functions that solve mathematical tasks, as well as a specialized programming language. But these programming systems are oriented towards specialists and should be studied by senior students, usually at a master's degree. Their use for educational purposes for schoolchildren and junior students, although considered in the methodological literature [13],[14], is very limited by the technology of using "enter a condition and get an answer".
3. The thematic software-methodological complex [15] by its structure and content is almost an ideal example of learning literature in algorithmization, because it contains a textbook "Sorting and searching algorithms", built as a collection of problems with theory, solution instructions, and texts of algorithms in Pascal, and programming environments and demonstrations of sorting and searching type algorithms. Electronic training manual is realized in three languages – Ukrainian, English and Russian. A significant disadvantage of the manual is a local software product, developed quite a long time ago – in 2003 [16].
4. There is a group of computer science teachers, university professors and employees of the Ministry of Education and Science of Ukraine. They conduct various competitions in programming for schoolchildren and students. This programming direction is called sports programming. That is why the

books from the authors - experts in sports programming, activists of Ukrainian Olympiad movement - deserve special attention. For example, these are, for example, a series of textbooks [17][20], representing problems of Ukrainian Olympiad and Olympiad organizers from Ukrainian and international school programming Olympiads for many years with instructions and solutions. Many other problem books, for example [21][22], are based on the materials of all-Ukrainian programming Olympiads.

5. At present, the programming Olympiad movement has acquired a wide scale and international character. A lot of popular educational literature in sports programming, devoted to its theoretical aspects, has appeared on the market, for example, [23][25]. We especially note the high theoretical and literary level [23][24].

2. Goals, Tasks, Structure and Content of the Textbook

2.1. Goal

As introduction says, the goal of this electronic training manual is to improve the quality of mathematical and fundamental programming training for schoolchildren and junior students of ICT specialties at universities. The ETM can be considered an introduction to computer algebra, a kind of first steps in the study of methods and technologies for processing symbolic computations.

2.2. Tasks

1. To make content and level of pupils' math level more close to the university level.
2. Prepare students for applied mathematics level.
3. Significantly improve pupils' algorithm component in the process of programming.
4. Encourage to study programming languages, English as a language of professional conversation for IT specialists.

2.3. Structure and Content of the Textbook

The content and structure of the electronic training manual are aimed at achieving the goal and completing tasks. Here's the content of the manual:

Foreword
1. Tasks and algorithms of computer arithmetic
2. Tasks and algorithms of computer algebra
3. Different tasks
4. Tasks for self-solution.
5. Training tasks
Conclusion
Literature

Here are examples of several tasks and guidelines for solving them. The numbering of tasks has been retained from the ETM.

Exercise 1. The contents of modern algebra studying books dedicated to mathematics analysis and geometry that pupils use in schools have nothing to do with algorithmization or programming. Documents that should explain the contents of reformed education actually do not mention the structural details of mathematical and programming education in colleges according to the conception of STEM education. However, we should expect basics of algorithmization and programming as part of college education program. Taking that fact to attention, the manual provides great amount of tasks that reveal some algorithmic aspects of "school" algebraic tasks, including tasks of neutral numbers, equations and numerical inequalities, equation and inequalities systems. Here are some examples of such tasks.

Task 2. Factorial

The natural argument function $f = n!$ plays a large role in mathematics. Therefore, great importance is attached to its research. In particular, the following problems are interesting for solving:

Task 2.1. Find the number of zeros, number $n!$ ends in decimal arithmetic.

Task 2.2. Find low single unequal to 0 digit of number *n*! in decimal arithmetic.
Write programs for solving tasks 2.1 and 2.2.

Task 6.2. Decimal periodic fractions

Write a program that converts the decimal periodic fraction *A,B(C)* to a fraction *p*/*q*. *A, B, C* – natural numbers in the interval [1; 10000], written in decimal arithmetic.

Task 8.3. Quadratic equation

Compose the algorithm and develop a program that solves the quadratic equation $ax^2 + bx + c = 0$ with integer coefficients *a, b, c* in radicals. Present the answer in the form $x = (A \pm B * sqrt(C)) / E$, where *A,B,C,E* are integers. The answer should be simplified as much as possible, i.e. present it as a simplification of the basic formula. For example, if $E = 1$, the answer should be $A \pm B * sqrt(C)$ (division sign and denominator are deleted).

Note Task 8.3, is well known to all schoolchildren from the 8th grade algebra course, the algorithm of its *approximate solution* is presented in any school course of the basics of algorithmization and programming, but the algorithm for its solution in *radicals* is not considered. From our point of view, this algorithm is ideal for revealing such a technique as building a *decision tree*.

Exercise 2. The basis for the fundamental training of future IT specialists at universities is "*Programming*", "*Algorithms and Data Structures*", "*Discrete Mathematic*", special courses in applied mathematics, among which we should especially note the course "*Computer Algebra*".

The content of the first two sections is aimed at the propaedeutics of such branches of mathematics as *Number Theory, Higher Algebra*. This choice is due to the practical importance of these sections in the fundamental training of IT specialists. At the same time, we focused on the tasks, the content of which corresponds to the level of knowledge of the students. For example, such topics of a university course as "*Fundamentals of Cryptography*", "*Continued Fractions*", etc. are not affected. In section 1, attention is paid to the topics of the "school" level: "*Euclid's Algorithm*", "*Modular Computing*", "*Numeral Systems*", etc. Section 2 covers the topics "*Solution and analysis of quadratic and cubic equations*", "*Systems of linear inequalities*", "*Equations and inequalities with modules*".

Section 3 presents mathematical and algorithmic tasks in various branches of applied mathematics. For example, Task 15 is essentially an introduction to the topic "*Syntactic Analysis*", and the solution algorithm is based on N. Wirth's syntax diagrams as a graphic metalanguage.

Task 15. Correctly constructed expressions.

An arithmetic expression is made up of one-letter variables, operator signs +, –, *, / and parentheses. Write a program that checks the syntax for this expression.

Task 19. Pattern search uses the notion of a *finite automaton* that admits a *regular language* based on word-pattern.

Note the final Task 20 and Task 21 of the third section, in terms of their condition, content, topic, solution algorithms, are topics for separate lessons or classes in a programming club.

Exercise 3. Each task of the three main sections of the ETM has the *instructions for solving*, as well as a reference to the source code of the program in one of the main programming systems supported by the corresponding ETM site.

Many instructions for solving tasks contain important *theoretical information*. So, instructions for **Task 1.1** contain a description of the *fast exponentiation algorithm*, instructions for **Task 2** contain number-theoretic formulas of the number of prime divisors *p* of an expression *n*!, and some versions of the Euclidean algorithm. In section 2, for example, instructions for solving **Tasks 9.1 – 9.4** contain the theory of analysis of a cubic equation, including such problems of analysis as the existence of a rational solution, the existence of 3 real solutions, and the existence of multiple solutions of a cubic equation.

Particular attention is paid to the theory of algorithms in the tasks of the 3rd section. So, in **Task 13** *Fibonacci numbers*, the essence of the solution is to prove that the cycle ends. **Task 16** *Bank Information System* introduces an important concept of a *real-time algorithm*. And the listing of examples can be continued.

Tasks 20 and 21 occupy a special place. **Task 20** *The quality of mobile communications* can be the subject of a separate lesson or class. In this task

- Helly's theorem [26] is used to formulate the algorithm;
- an important difference between *existence algorithms* of a decision and algorithms for a *constructive decision* is considered;

- in the form of a library calculations in the field of fractions are implemented;
- the necessary tasks of analytical geometry are implemented in the form of a library;
- negative effect of lengthening data-rational numbers and indicated measures to eliminate this drawback due to a reasonable compromise between accurate calculations with fractions and approximate calculations with data-real numbers is demonstrated.

Exercise 4. Electronic textbook "*Mathematical tasks programming. First Steps*" supports the currently actual programming languages C/C++, Python, as well as the programming language Pascal. From our point of view, it is the most suitable for the initial study of the basics of algorithms and programming and undeservedly relegated to the background. This ETM, in addition to the Ukrainian and Russian languages of instruction, also supports English – the language of professional communication of IT specialists.

We plan, while retaining the idea, the general core and structure of the electronic textbook, to provide an opportunity to develop all its 9 variants of *the programming language – the training language* relatively independently, entrusting the development to various but interacting groups of authors. General methodological guidance will support the overall direction of development.

3. Methodological Aspects of Using the Textbook

As we see, the ETM is built on the principle of a collection of tasks. One of the main disadvantages of the existing collections of tasks is that they neither often contain instructions for the solution, nor, moreover, correct (from the point of view of the authors) solutions in the form of source codes. Such collections of tasks are not very suitable for the independent work of pupils and students. Our experience in teaching the basics of algorithmicization and programming to junior students, high school students, as well as students of advanced training courses for teachers of computer science, shows that without "correct prompts", solving of simple programming tasks are ineffective.

It is simply impossible to solve tasks of the Olympiad level of complexity in the process of initial training in the basics of algorithmization and programming without prompts. Moreover, often even indications for a solution at the level of a meaningful presentation of algorithms are insufficient. It is known that important aspects of an effective solution are data structures and control structures adequate to them, the presentation of which is possible either in a pseudo-language or in a programming language. Therefore, we propose a three-level structure of an electronic textbook:

Task – Instructions for Solution – Source Code

Consider, as an example, the presentation of one of the tasks in Section 2:

Task 9.4. Multiple roots of a cubic equation

Create a program that, using a given cubic equation $x^3 + ax^2 + bx + c = 0$ with integer coefficients, determines the presence of roots of multiplicity 2. The program should not use the algorithm of Task 9.2.

Instructions for Solution

To compose this algorithm, the reasoning in Task 9.3 can be used. Indeed, an equation $x^3 + ax^2 + bx + c = 0$ has a root of multiplicity 2 if the simplified equation $z^3 + Bz + C = 0$ has a root of multiplicity 2. Denote $f(z) = z^3 + Bz + C$. It can be proved that the equation $f(z) = 0$ has a root z_1 of multiplicity 2 if and only if $f'(z_1) = 0$. It means that the equation and the derivative of its left-hand side have a common root, i.e. the greatest common divisor $\gcd(f(z), f'(z))$ is a polynomial of degree greater than zero.

Let's consider another method for solving this problem:

Method of invariants

If the cubic equation

$$x^3 + ax^2 + bx + c = 0 \qquad (1)$$

has a root *p* of multiplicity 2, it can be represented as

$$(x-p)^2(x-q)=0$$

Expanding the brackets and giving similar ones, we get

$$x^3-(2p+q)x^2+(p^2+2pq)x-p^2q=0 \quad (2)$$

Then $a=-(2p+q),\ b=p^2+2pq,\ c=-p^2q$.

In this system, p, q values must be excluded. As a result of carrying out equivalent transformations for the coefficients of equation (2):

$$\begin{cases} a=-2p-q \\ b=p^2+2pq \\ c=-p^2q \end{cases} \leftrightarrow \begin{cases} q=-2p-a \\ A=2a^2-6b \\ B=-ab+9c \\ p=B/A \\ 3B^2+2aAB+bA^2=0 \end{cases} \quad (3)$$

The relation in line 5 of the resulting system (3) does not depend on p, q. This relation, together with the formulas of the first and fourth lines of the system, can be called the *invariant* of the roots of multiplicity 2 for the reduced cubic equation. It is satisfied if and only if the equation has multiple roots.

The algorithm for determining the existence of roots of multiplicity 2 checks the fulfillment of invariant (3). The first and fourth formulas of system (3) have the solutions of the system. These formulas show that the roots of the equation are rational numbers.

Therefore, the presented method can be used to determine the roots of multiplicity 3, as well as to check other algebraic relations between the roots of algebraic equations.

The third level of the task statement is the source code from the authors of the manual. Here, the user (pupil or student) has the opportunity to open the corresponding programming system and write task solution in this system (Figure 1).

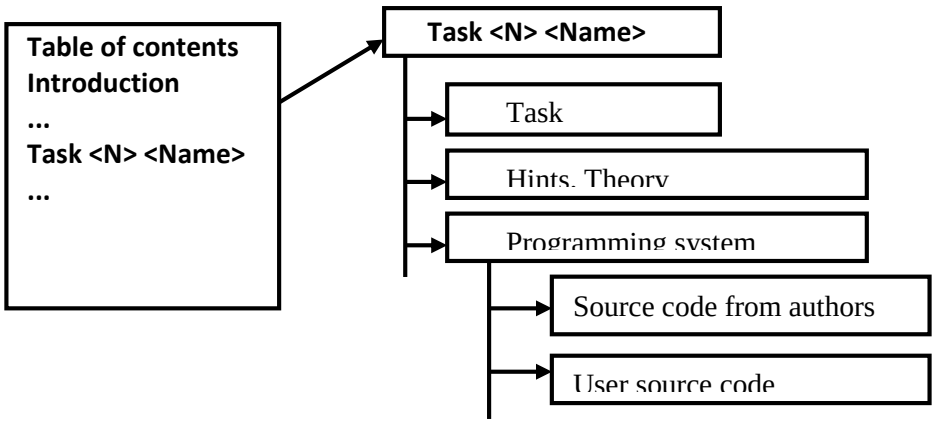

Figure 1: Levels of task presentation in the program

Here is the source code of the program-solution in Pascal, C/C++, Python:

```
Program CubicEquation;
Var
  a,b,c:  LongInt;
  p, q:   LongInt;
  _A, _B: LongInt;
Begin
  Write(' a = '); Readln(a);
```

```
  Write(' b = '); Readln(b);
  Write(' c = '); Readln(c);
  _A := 2*Sqr(a)-6*b;
  _B := -a*b + 9*c;

  If 3*Sqr(_B) + 2*a*_A*_B + b*Sqr(_A) = 0
      Then Begin
        p := _B div _A;
        q := -2*p - a;
        Writeln(' x1 = x2 = ', p);
        Writeln(' x3 = ', q);
      End
      Else Writeln('No Double Roots')
End.
```

The source code of the program-solution Task 9.4 in C / C ++:

```
#include <stdio.h>
void main()
{
      long a, b, c, res;
      long p, q;
      long _A, _B;
      printf("a = ");
      res=scanf("%d", &a);
      printf("b = ");
      res=scanf("%d", &b);
      printf("c = ");
      res=scanf("%d", &c);
      _A = 2*a*a-6*b;
      _B = -a*b + 9*c;
      if (3*_B*_B + 2*a*_A*_B + b*_A*_A == 0) {
            p = _B / _A;
            q = -2*p - a;
            printf("x1 = x2 = %d \n", p);
            printf("x3 = %d \n", q);
      }
      else printf("No Double Roots \n");
}
```

The source code of the program for solving Task 9.4 in Python:

```
a=int(input(' a = '))
b=int(input(' b = '))
c=int(input(' c = '))
A = 2*a**2-6*b;
B = -a*b + 9*c;
if 3*B**2 + 2*a*A*B + b*A**2 == 0:
    p = B // A;
    q = -2*p - a;
    print(' x1 = x2 = ', p);
    print(' x3 = ', q);
else:
    print('No Double Roots')
```

The format of the electronic textbook, implemented as an Internet application, in combination with the principle of relative independence of versions defined by programming languages and user interface languages, allows the authors to quickly improve the content of the textbook.

4. Software Implementation of the Electronic Textbook

4.1. Requirements for the ETM Software

The ETM software is a Web-application that has client-server architecture. The server part of the application runs under the control of a Web-server and provides the user with the Internet using a Web browser.

The technological requirements for the ETM software are reduced to the requirements for creating a software environment that provides the tasks solution of programming algorithms for solving mathematical problems:

- authorized access to educational information;
- system administration;
- effective development of information resources by users.

At the same time, the ETM meets the basic requirements for organizing distance learning in the Internet, namely:

- providing access to educational materials using the Internet;
- provision of copyright for user-created electronic learning resources;
- accumulation in the database of the system of educational information resources (mathematical problems, instructions for solving, algorithms for solving mathematical problems in the form of program code, etc.) in the format of the IMS standard, their import and export;
- providing group work in the network;
- informing users about the course and results of the educational process;
- dissemination (distribution) of educational material.

There are the main software and hardware requirements for design and development of the ETM software.

1. Requirements for functional characteristics.

The software tool “Mathematical tasks programming” fully provides system administration, user authorization, creation of copyright electronic educational resources (EER), study groups, learning process management, saving and statistical processing of learning outcomes.

2. Requirements for individual modules.

The software tool “Mathematical tasks programming” is developed in a client-server architecture using object-oriented design technology and consists of separate software modules.

The software module - an authorization and security system - ensures the registration of users, granting them access rights to the ETM with the assignment of roles and rights of the administrator, tutor and student, protection of system data from unauthorized access.

The software product – Microsoft SQL Server database - provides storage of data about users, training groups, copyright EER, results of the educational process, as well as all other necessary documents of the system.

The software module – a specialized rich-editor for the development of EER – provides the development of author's mathematical tasks, which consist of a problem statement, instructions for a solution, the algorithm for task solution in the form of a program code.

The software module – a library of mathematical tasks – provides storage of the author's EER in a database, storing information about the author, and using them in the tasks of the educational process.

The software module – a system of learning process managing – ensures the creation of learning groups, the creation of an individual educational task using the library of the author's EER, the implementation of the educational task by the student in the group, the preservation of the learning outcomes of each student.

The software module – a automated system for checking and verification new authoring EER – provides verification of the correctness of the submitted new author’s EER before storing them in the library of mathematical tasks.

4.2. Modeling and Software Design

The requirements for the EPE software are used in the design of the software for the Web application "Mathematical tasks programming" [27].

Figure 2 shows a diagram of the EER software architecture.

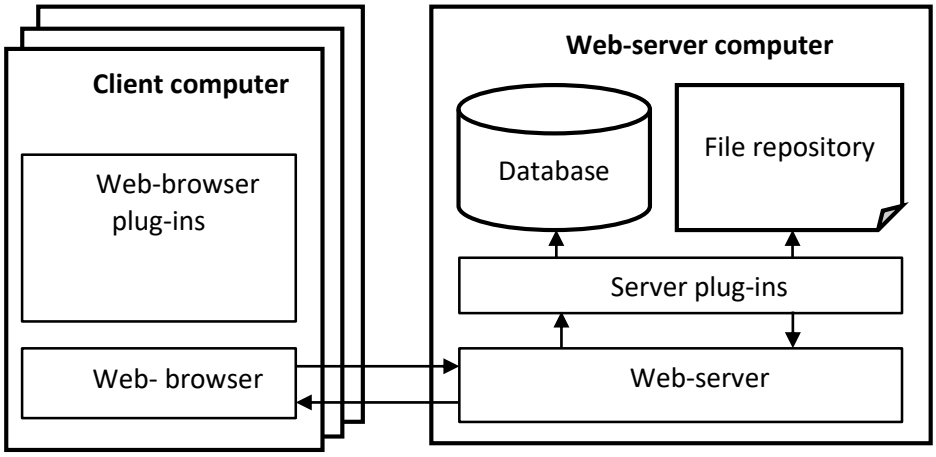

Figure 2: Architecture of the Web-application "Mathematical tasks programming"

Browser plug-ins provides content management on site pages in a Web-browser. These software modules include:

- Textbook in hypertext format.
- Rich editor for entering and editing conditions of mathematical problems, instructions for tasks solving and algorithms in the form of program code.

Server plug-ins handle client requests and interactions with the database and file storage. These software modules include:

- Parser of client requests processing.
- The module for generating queries to the database, processing of the received data from the database.
- Module of file storage data managing.
- Module of verifying the code of solving mathematical tasks algorithm created by the user.

The Web-server software handles HTTP client requests and generates data for the user interface.

4.3. User Interface

The user of the electronic training manual uses a Web browser to work with it, which is accessed through the authorization module. The Web browser plug-ins are implemented in JavaScript using the Angular JS and JQuery libraries. JSON (JavaScript Object Notation) and XML were used as the textual data exchange format. Figure 3 shows a schematic diagram of the ETM home page.

The choice of the teaching language determines the language of the software interface, including the textbook and the math tasks editor.

The choice of the programming language determines the language of the program code in the algorithms of mathematical tasks solving. By clicking the "Textbook" link, the user enters the page of displaying the EER (Figure 4).

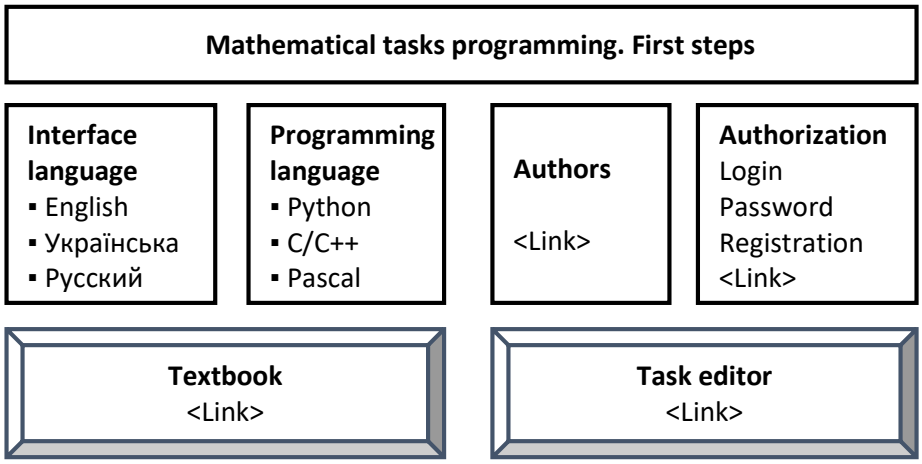

Figure 3: The schematic diagram of the ETM home page

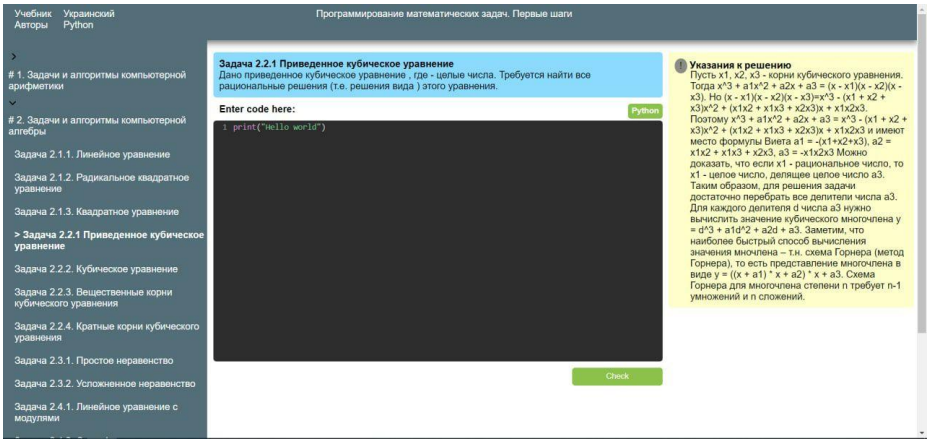

Figure 4: Page of the e-Textbook

The EER interface allows the user to select a mathematical task for its algorithmic solution in the format of the program code in the selected programming language. The user has the opportunity to solve independently the selected task with subsequent verification of the correctness of the solution. Also, the user can call the author's solution to the task and compare it with own solution.

Following the link “Task Editor”, the teacher has the opportunity to develop the own author's EER in the template of the name and formulation of a mathematical task, instructions for task solving and algorithms for task solving in the form of a program code. In this case, a specialized rich editor is used, adapted to the syntax of the programming languages Pascal, C/C ++, Python.

4.4. Approbation in the Educational Process

The expert method was applied to assess the prospects for the Web-application using “Mathematical tasks programming” in the educational process. 12 experienced teachers of mathematics of secondary schools in Kherson were interviewed. They answered the questionnaire. A five-point Likert system was chosen for the assessment. Table 1 shows the results of the EER assessment of according to the indicators of its use.

Table 1. Expert assessment of the quality and prospects of using the Web-application “Mathematical tasks programming” in the educational process.

Table 1

Expert assessment of the quality and prospects of using the Web-application “Mathematical tasks programming” in the educational process

#	Evaluation Options	Grade
1	Training program compliance	4,1
2	Scientific validity of educational resources use	4,4
3	Unified methodology compliance	3,8
4	Availability of educational resources using	2,9
5	Optimality of the technological qualities of the educational resource	4,0
6	The importance of educational resources interactivity	4,2
7	Ease of educational resource use	3,3
8	Students motivation	4,5
9	Classroom use	3,6
10	Use in independent work	4,7
11	Interest of teachers in educational resource using	3,9
12	I plan to use such educational resource	3,7

The results of expert's assessment showed on Diagram 1.

The expert assessment of the quality and prospects of using educational resources is considered quite reliable with a good agreement of expert assessments. Therefore, the statistical processing of the results of expert assessments included the analysis of the consensus of experts. The concordance method was used to assess the degree of expert agreement on the options for the assessment [28]. The hypothesis about the consistency of expert assessments was confirmed by the Pearson criterion.

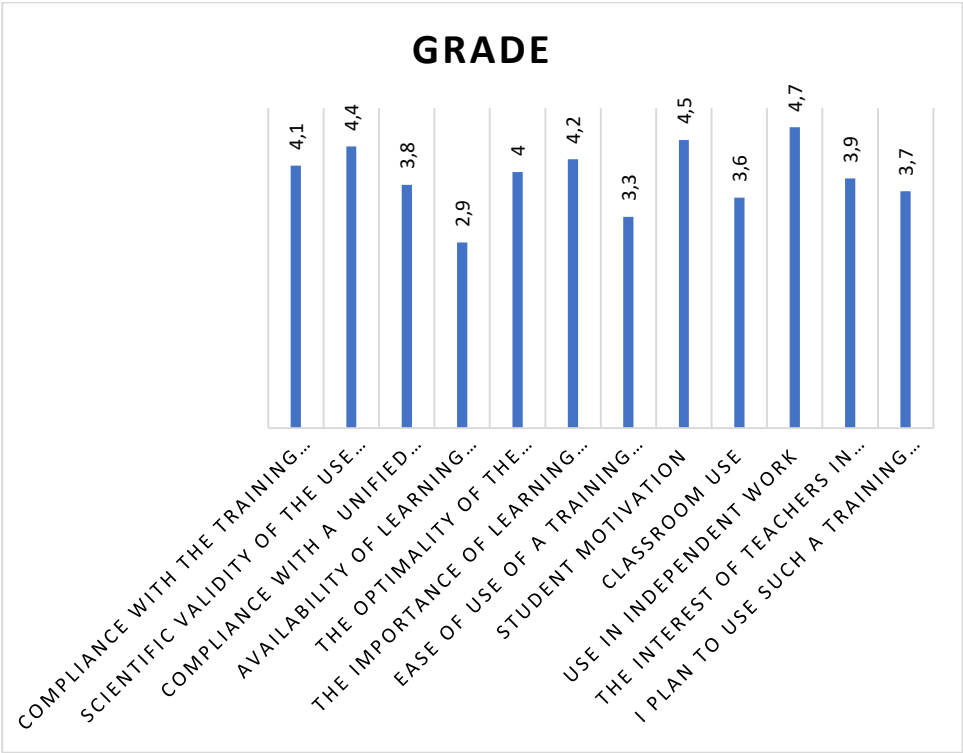

Diagram 1. Expert assessment of educational resource "Mathematical tasks programming"

5. Conclusions and Outlook

The analysis of educational literature showed there are practically no thematic collections of tasks with the following characteristics:

- The collection of tasks is presented as an Internet resource;

- The collection of tasks is devoted to the programming of mathematical tasks and is an elementary introduction to computer algebra;
- The tasks of the main sections of the collection are presented as:
- Task – Instructions to the solution – Source code of the solution program;
- The collection of tasks supports the most common programming languages in sports programming Pascal, C/C ++, Python.
- The collection of tasks uses three languages of the user interface: Ukrainian, English, Russian.

Methodological and software-technical requirements for the ETM software have been developed. The ETM software is a Web-application and is built on a client-server architecture.

From our point of view, teaching aids of this type will be useful in the educational process of schools and universities working in accordance with the concept of STEM education.

6. References

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