

## Algorithmization tests development of spatial imagination

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**Summary.** In the article it is looked at the method algorithmization of chosen tests for development of spatial imagination, proposed combined algorithm for test of spatial imagination, shown schematic use of auxiliary algorithm. Setting further set of measures.

**Key words:** spatial imagination, testing, algorithmization, linear algorithm, branching algorithm, auxiliary algorithm, cyclic algorithm.

### INTRODUCTION

The increasing number of subjects were closely linked to the computerization and programming that leads to change and transformation of educational system. These changes are associated with parts of the constant improvement of educational system that enables to raise the level of science and technology. One of the key components of science is the control and verification of knowledge. The most objective method of verification of knowledge and skills are tests. Previous article reviews basic criteria for tests of spatial imagination and their comparative analysis, through which were found potential unaccounted criteria of existing tests [6]. This article guides us to improve the search quality of tests for spatial imagination, this can be achieved through

algorithmization of tests structure listed in the previous article.

### PURPOSE OF WORK

The purpose of this article is to determine the algorithmic parts of the test of spatial imagination (TRPU), identification of problems of these tests. Combined TRPU algorithm development with subject to certain criteria.

### FORMULATION OF THE PROBLEM

Modern testing technology allow not only to evaluate testing results but also register all actions and time participant used for this effect, that is why tests of spatial imagination should be closely analyzed and improved. Systematic consideration of the problem of graphic technology allows us to explore and implement new methods of spatial imagination [9, 15].

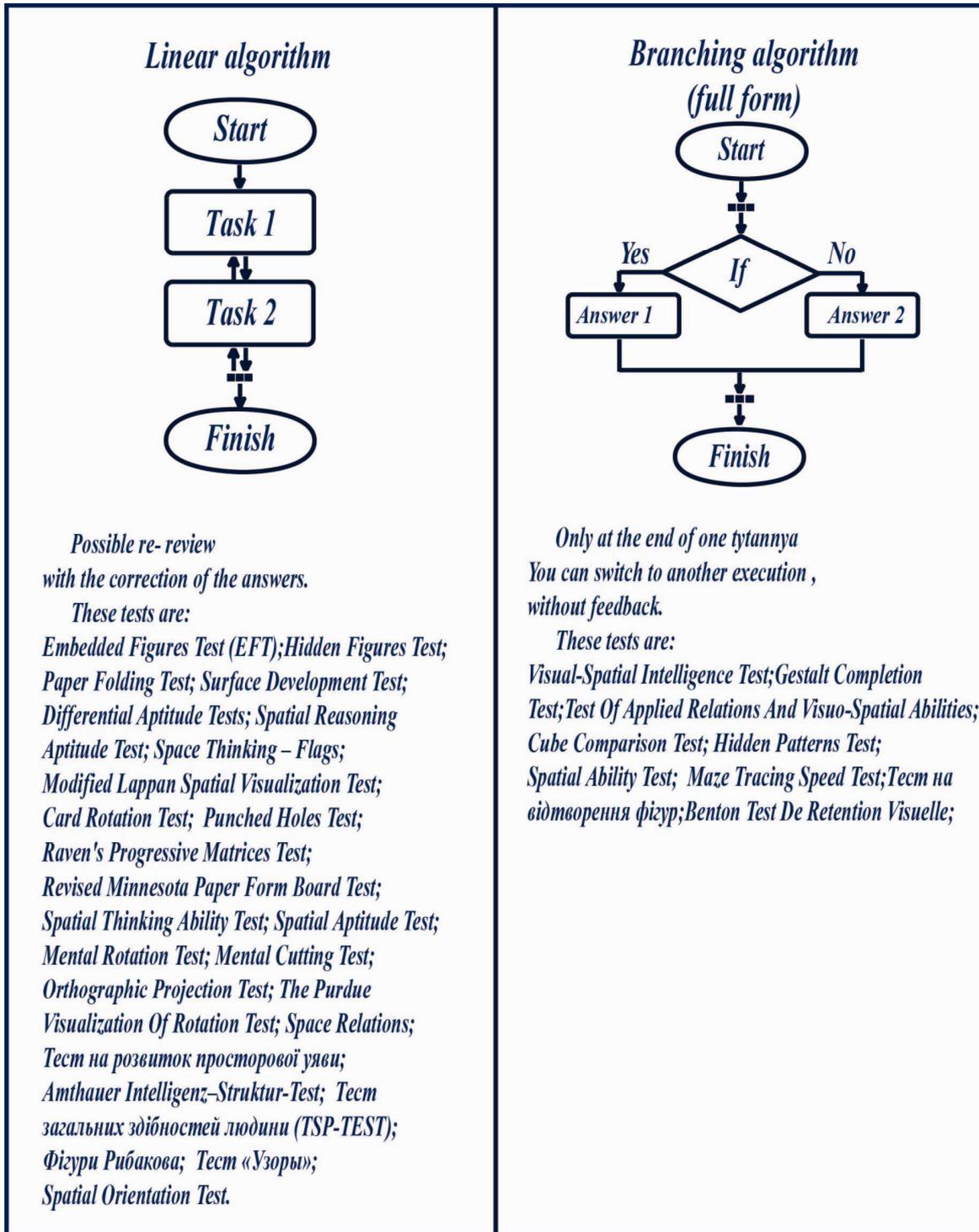
### MAIN PART

Algorithms depending on the purpose of initial conditions, problem and ways of resolving, determination and actions are divided into: probabilistic, heuristic, linear, branched, cyclic and support.

After detailed analysis of tests of spatial imagination and system rules for discrete process of each of the algorithms, it can be concluded that the use algorithmization structure of tests of spatial imagination are con-

sidered only in two types of algorithms, all others are not involved (Fig. 1).

Algorithms of simple (linear) processes do not contain any stages that has more than one heir, i.e. algorithms implemented a simple



**Fig. 1.** Definition algorithmization structure of TRPU

sequence of operations. An example of a linear algorithm of test of spatial imagination is test on paper with ability to return to previous questions and redo them (in some tests corrected answers are counted for the mistake).

Branching algorithm – the second of the typical kinds of algorithms. Branching begins with certain conditions, if the condition is satisfied, the action or set of actions takes place – if not different. Computer tests can be included to tests with algorithm of branching, where it is impossible to return to the previous questions without answers given (not necessarily true) on the previous one. Examples are paper tests in which the rules does not allow transitions between questions [2, 3, 13].

As a result of the mechanism consideration of algorithms of tests for spatial imagination formation another test algorithm may be offered, such as combined.

Combined algorithm of tests of spatial imagination may contain several different functions and supporting algorithms for better effectiveness of test. Thus, we can broaden the base of reach and qualitative level of testing. Implementation of combined algorithm of TRPU will allow to estimate not only the testing participant's level, but also his knowledge of the structure and potential in learning.

Based on previous studies of algorithmization TRPU basic schemes of algorithms (linear algorithm, branching algorithm) were revealed. The result of this study allows to develop a model of combined algorithm by using of different types of software algorithmic systems, depending on the purpose and objectives of the test [8, 14, 22].

At the stage of requirements analysis for testing process the purpose and goal of development was defined. The purpose of combined TRPU algorithm development is to create a quality product evaluation of spatial imagination of students. The main goal in creating combined TRPU algorithm is successful validation of the product.

Therefore, it was decided to form a combined system of linear, cyclic, auxiliary algo-

rithms and branching algorithm. The system will help improve the efficiency of testing.

For correct construction of combined TRPU model it is necessary to consider the priority of algorithms in terms of complexity. In the above tests, the sequence of questions is increasing or linear (all tasks of one form). An essential criteria is mutually beneficial position of blocks in algorithm. Forms a sequence of test tasks of spatial imagination needs improvement and logical structuring [4, 7].

To create final combined TRPU algorithm it is needed to determine what form of tests and in what sequence will be used in the known tests. This knowledge base will allow to carefully prepare a platform for the creation of a combined test algorithm of spatial imagination [12, 21].

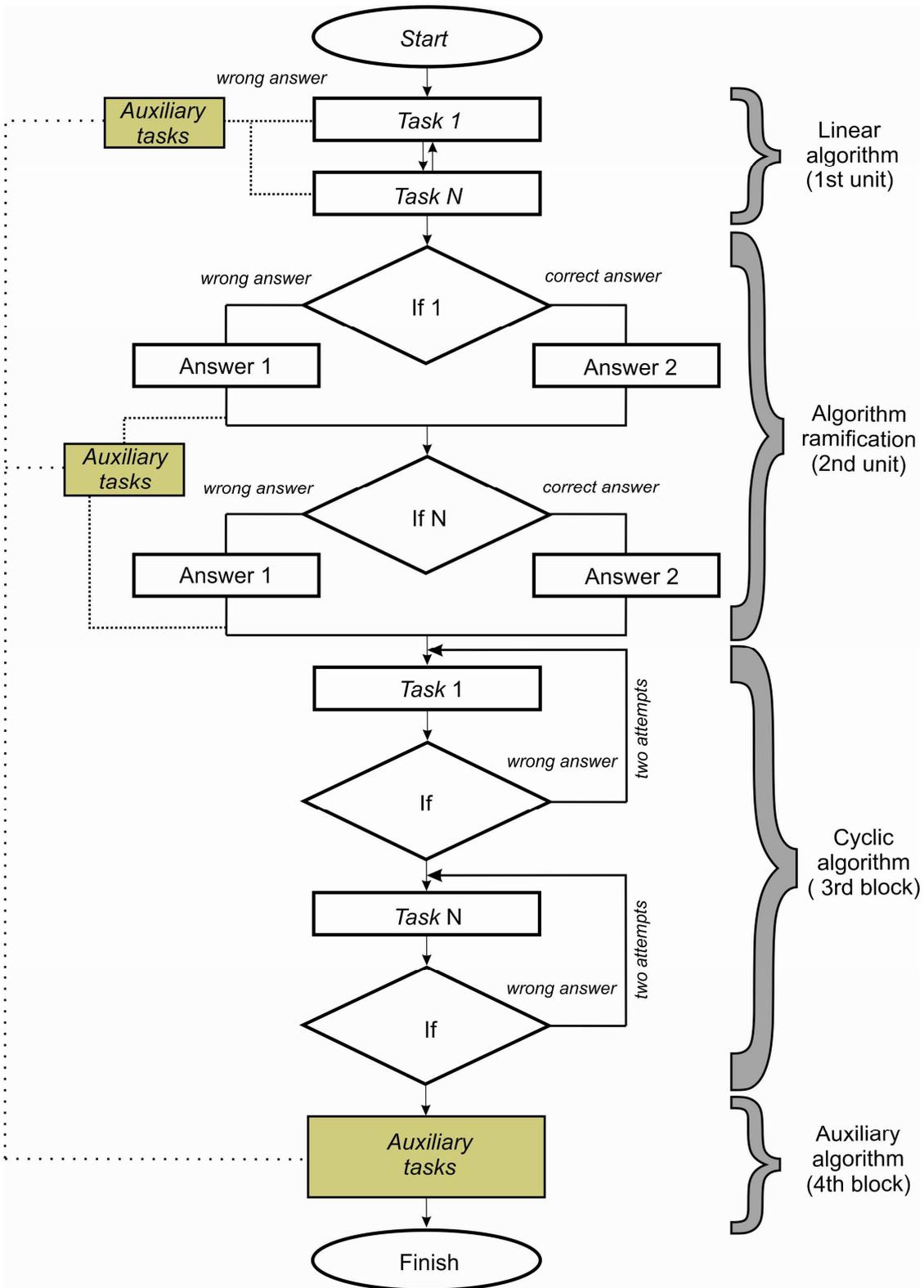
During test creation open and closed forms of tests are used, that are recommended for use by SMC MES of Ukraine [16].

Tests with open form allow to fill free answer or complement the answer. The tasks of the open form are: tasks with gaps, tasks with addition, tasks with short answer, and tasks with expanded answer [17]. The task of open form evaluates the knowledge and skills in calculation, knowledge of facts, rules, terms, etc. Tests of open form with properties and characteristic belonging to tasks of branching algorithm.

The tasks of the closed form, with choice answers include: the task with one or more correct answers. These tasks belong to linear algorithm, transition to the previous task is possible between tasks this algorithm.

Also, the closed form tasks include tasks on restoring of compliance, tasks to establish the correct chronological or logical sequence – these are tasks of cyclic algorithm block.

In standardized academic performance tests most commonly used form is closed tasks, these tasks diagnose understanding and application of knowledge, sequence of



**Fig. 2.** Block diagram of combined TRPU algorithm

actions and operations. In tests of spatial imagination primarily tasks of the closed form are used.

For effectively verification of knowledge and skills, it is recommended to add auxiliary algorithm for combined algorithm of spatial imagination tests. All blocks of fixed algorithms (linear, branching, cyclic), include auxiliary tasks which are to be placed in the fourth block of combined algorithm [11, 18].

This block is generated from similar questions that student did not give the correct answer. This optional feature of this algorithm is to re-examine the level of knowledge of the topics specified (Fig. 2).

Creating step by step productive flowchart of combined algorithm, next necessary step to develop the full form of the test is to apply additional elements to the test circuit such as time, color, work with memory and more [20].

In further work, in order to minimize the number of errors in the creation and use of combined TRPU it is needed to create a set of measures:

- Formulation of the problem of tests and practical tasks development;
- Design of tests and practical tasks;
- Verification of tests for compliance with the task;
- Implementation of testing process;
- Study and analysis of test results.

## CONCLUSION

Development of tests for spatial imagination makes a substantial contribution to the process of integration of educational courses for technical, architectural and artistic disciplines [5, 19, 10]. The presence combined algorithmization tests of spatial imagination will significantly increase the effectiveness of modern graphics technology.

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#### АЛГОРИТМИЗАЦИЯ ТЕСТОВ РАЗВИТИЯ ПРОСТРАНСТВЕННОГО ВООБРАЖЕНИЯ

**Аннотация.** Рассмотрен метод алгоритмизации выбранных тестов развития пространственного воображения, предложен комбинированный алгоритм теста развития пространственного воображения с учетом основных критериев создания тестов, показано схематическое использование вспомогательного алгоритма. Определение дальнейшего комплекса работ по разработке комбинированного алгоритма теста развития пространственного воображения.

**Ключевые слова:** пространственное воображение, тестирование, алгоритмизация тестов, линейный, вспомогательный, циклический алгоритмы, алгоритм ветвления.