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Technology of Designing and Applying Methods of Thinking-Developing Games in Mother Tongue and Reading Literacy Lessons

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Abstract: This article examines the scientific and methodological foundations of designing and implementing didactic games aimed at developing primary school pupils' thinking skills in mother tongue and reading literacy lessons. It substantiates the relationship between learning objectives, cognitive operations, educational tasks, game rules, assessment, and reflection. The article analyzes criteria for selecting and designing games, integrating them into lesson stages, and adapting them to the age-related and individual characteristics of pupils in grades 1-4. A methodological model for designing thinking-oriented games is proposed, consisting of target, content, procedural, and assessment-reflective components.

Keywords: Mother tongue, reading literacy, primary education, thinking, didactic game, game methodology, pedagogical technology, game design, logical thinking, creative thinking, reflection.

Introduction: Developing pupils' thinking in primary education is closely intertwined with mastering educational content, shaping speech competencies, and fostering independent cognitive activity. Mother tongue and reading literacy lessons, in particular, expand pupils' opportunities to think about words and concepts, comprehend text content, analyze information, identify cause-and-effect relationships between phenomena, and draw independent conclusions. Utilizing didactic games in this process is of special pedagogical significance because game activity corresponds to the age characteristics, interests, and cognitive needs of primary school pupils. However, merely introducing a game into the educational process does not guarantee its developmental effectiveness. A game must be designed based on a clear pedagogical objective, its content must align with the curriculum, its tasks must activate specific cognitive operations, and its outcomes must be evaluated based on appropriate criteria. In L.S. Vygotsky's theory of sociocultural development, play is interpreted as a form of activity that expands a child's developmental potential [1]. J. Bruner's concept of discovery learning emphasizes that students acquire knowledge through independent exploration and problem-solving tasks [2]. These theoretical views substantiate the necessity of designing didactic games not merely as a tool for making lessons interesting, but as a technology for purposefully developing cognitive activity. Another important issue in developing game methodology is the correspondence between the game task and the targeted thinking skill. For instance, a game aimed at grouping words activates classification and generalization; a game aimed at restoring the sequence of events activates logical consistency; and a game aimed at evaluating a literary character's decision activates analytical and critical thinking. From this perspective, developing the technology for designing and applying thinking-oriented games is one of the pressing issues in primary education methodology.

The purpose of the study: To substantiate the scientific-methodological technology of designing, selecting, applying, and evaluating didactic games that develop primary school pupils' thinking in mother tongue and reading literacy lessons.

Research tasks: to determine the pedagogical and psychological characteristics of thinking-development games;

to develop didactic criteria for game design;

to substantiate the compatibility between game content and cognitive operations;

to determine the stages of integrating games into the lesson process;

to develop game tasks suited to the age characteristics of grades 1-4 pupils;

to propose mechanisms for evaluating and reflecting on game activity outcomes.

METHODS

The study has a theoretical-methodological character, relying on the study of pedagogical and psychological literature, scientific-theoretical analysis, comparative analysis, generalization, classification, and pedagogical modeling methods. The research methodology comprises the following approaches:

Activity-oriented approach: The student must actively participate in the process of acquiring knowledge, perform tasks independently, and comprehend the outcomes of their activity.

Personality-oriented approach: Game tasks are adapted to the pupils' individual abilities, interests, knowledge levels, and learning paces.

Competency-based approach: Games are directed not only toward repeating theoretical knowledge, but also toward applying it in new situations, substantiating thoughts, communicating, and solving problems.

Developmental education approach: Game tasks encompass assignments slightly above the pupil's current knowledge level, yet achievable through pedagogical scaffolding. Based on these approaches, the following cognitive operations were adopted as the primary methodological criteria in designing games:

Cognitive operation	**Manifestation in the game task**
Analysis	Breaking down a word, sentence, text, or event into component parts
Synthesis	Forming a coherent meaning from separate parts
Comparison	Identifying similarities and differences
Classification	Grouping words and concepts
Generalization	Drawing a general conclusion based on several examples
Cause-effect identification	Explaining the cause and result of an event
Problem-based thinking	Finding a solution to a given situation
Creative thinking	Creating a new idea, title, text, or alternative solution
Reflection	Evaluating one's own answer and thinking process

The game technology proposed in this study is based on theoretical-methodological analysis and didactic design rather than empirical trial-and-error results.

RESULTS

Didactic Foundations of Designing Thinking-Oriented Games Didactic game design is the process of pre-planning educational goals, game content, tasks, rules, participant activity, result evaluation, and reflection in an interrelated manner. When designing a game, it is advisable to adhere to the following seven criteria:

1. Purposefulness: The game must have a clear educational and developmental goal.

2. Content compatibility: The game must be directly connected to the educational material of the mother tongue or reading literacy subject.

3. Thinking orientation: The game must require the pupil to analyze, compare, generalize, draw conclusions, or think creatively.

4. Age appropriateness: The complexity of the task must match the pupils' age and psychological characteristics.

5. Activity and collaboration: The game must ensure the participation of all pupils.

6. Productivity: At the end of the game, there should be an opportunity to observe a specific outcome in the pupil's knowledge or thinking activity.

7. Flexibility: It should be possible to simplify or complicate game tasks depending on the pupils' level of preparation.

Thus, the effectiveness of a game depends not on its external appearance, decoration, or competitive format, but on how it engages the pupil in thinking activity.

Structural Model of Game Design

Within the framework of the study, a four-component model for designing didactic thinking-development games is proposed:

Component	Content	Core Question
Target	Determining the thinking skill to be developed and the educational outcome	Why is the game organized?
Content	Selecting educational material, problem situations, and tasks	What is the game based on?
Procedural	Game rules, participants, sequence of execution, and pedagogical scaffolding	How is the game implemented?
Assessment-reflective	Determining outcomes, substantiating thoughts, and evaluating one's activity	How are the game results determined?

The distinctive feature of this model is that the game project does not consist merely of tasks and rules. How the pupil thinks, what outcomes they achieve, and how they evaluate their activity are also pre-planned.

Game Methodology for Mother Tongue and Reading Literacy Lessons Below are authorial methodological developments focused on cognitive operations that can be applied during lessons.

"Find the Odd One Out and Justify" Game

Purpose: To develop analysis, classification, and generalization skills in pupils.

Game material: Cards with written words.

Task: Pupils are presented with the following words: apple, pear, peach, carrot, grape. They identify the word that does not belong to the general group and explain their choice.

Complication: A set of words is provided where multiple answers can be logically justified. For example, a pupil separates "carrot" because it is a vegetable, while another pupil might propose a different classification based on syllable or sound structure. In this case, well-founded alternative answers are also accepted.

Developmental outcome: Classification, comparison, generalization, and argumentation.

"Logical Chain" Game Purpose: To comprehend the sequence of events and develop logical consistency.

Game material: Cards with individual sentences taken from a text.

Task: Pupils are given sentences with disrupted event sequences. They arrange the sentences in logical order to form a cohesive text.

Order of execution: sentences are written on separate cards;

pupils read and review the meaning of the sentences;

they identify causal and temporal relations between events;

Complication: Certain sentences are removed, and pupils are asked to create a new sentence matching the text's context.

Developmental outcome: Analysis, synthesis, cause-effect identification, and logical thinking.

Technology for Complicating Game Tasks Across Grades 1-4

When designing games, it is important to consider the age characteristics and cognitive capabilities of primary school pupils. The same game should not be applied with identical tasks and complexity in all grades.

Grade	Nature of game tasks	Priority thinking skills
Grade 1	Tasks based on pictures, objects, sounds, syllables, and simple words	Differentiating, grouping, simple comparison
Grade 2	Working with words, sentences, and short texts; simple logical chains	Analysis, comparison, sequencing
Grade 3	Games based on text content, characters, and cause-effect relationships	Generalization, conclusion drawing, argumentation
Grade 4	Problem situations, hidden meanings, alternative solutions, and creating independent text	Critical, creative, and reflective thinking

This distribution is not a rigid age norm, but rather a methodological recommendation serving to progressively complicate game tasks. Pupils' individual preparedness and the content of the curriculum must also be taken into account.

Lesson Process

Introducing thinking-development games into lessons can be carried out based on the following technological sequence:

Stages of Introducing Game Technology into the

Stage	Teacher activity	Pupil activity
Preparation	Defines the goal, selects the game and materials	Prepares to get acquainted with the game content

Motivation	Creates a problem situation or interesting task	Shows interest in the task, puts forward hypotheses
Instruction	Explains game rules and demonstrates an example	Understands the rules and asks questions
Independent activity	Observes the process, provides necessary pedagogical scaffolding	Performs the task individually or in a group
Analysis	Guides the discussion of answers	Substantiates their answer, considers alternative opinions
Assessment	Evaluates the outcome based on established criteria	Analyzes their own activity and outcome
Reflection	Articulates the thinking process through final questions	Explains what they learned and how they thought

A game can be applied during the introductory, new material mastery, reinforcement, or concluding stage of a lesson. However, its duration must not crowd out the main objective of the lesson; game activity must serve to deeply master educational material.

Assessment and Diagnostics of Game Outcomes

In determining the effectiveness of game technology, one should not be limited to whether a pupil wins or loses, completes a task quickly, or gives a correct answer. The primary focus should be directed toward the pupil's thinking process and independent conclusion-drawing ability. The following criteria can be used for this purpose:

Assessment criterion	**High level**	**Intermediate level**	**Initial level**
Independent thinking	Performs the task independently and expresses new ideas	Expresses thoughts with partial assistance	Constantly needs scaffolding
Analysis	Analyzes information independently	Analyzes with the help of guiding questions	Struggles to distinguish key features
Logical	Substantiates their answer	Substantiates their	Struggles to

Assessment criterion	High level	Intermediate level	Initial level
argumentation	consistently with evidence	answer partially	substantiate their answer
Alternative solution	Proposes several well-founded solutions	Proposes one acceptable solution	Needs help finding a solution
Reflection	Evaluates their own activity independently	Evaluates with the teacher's help	Struggles to evaluate their own activity

In assessment, the teacher can utilize observation, pupil responses, written tasks, group discussions, and reflective questions. The following questions are recommended for reflection:

What problem did I solve today?

Which method did I use to find the answer?

With what evidence did I substantiate my thought?

DISCUSSION

Unlike applying didactic games randomly or solely as entertainment activities, the methodological model developed within this study envisages directing them toward pre-determined educational outcomes. Here, the compatibility between game content, task type, and the cultivated cognitive operation is of decisive importance. For instance, if the "Find the Odd One Out" game is limited merely to separating words, its developmental potential remains relatively narrow. If the pupil is required to explain the reason for the choice, propose another classification criterion, and justify alternative answers, the game also encompasses analysis, generalization, and argumentation processes. Thus, the developmental value of a task largely depends on the questions and supplementary assignments posed by the teacher. The reciprocal teaching approach founded by A. Palincsar and A. Brown demonstrates that strategies of questioning, clarifying, summarizing, and predicting activate the text comprehension process [3]. Integrating these strategies into game tasks expands pupils' opportunities to work independently on texts. J.P. Gee analyzed aspects of the learning process in a gaming environment related to active participation, problem-solving, and feedback [4]. These views show that in didactic games, it is important not only for the pupil to find an answer, but also to realize mistakes and test a new strategy.

At the same time, there are certain limitations in applying game methodology. In particular, excessive complexity of a task can lead to a drop in pupil interest, while a purely competition-oriented approach may cause some children to be left out of the activity. Setting speed as the main criterion during a game also limits the opportunity for deep analytical thought. Therefore, when organizing games, it is advisable for the teacher to combine individual and group activities, encouraging pupils based on personal development dynamics rather than mutual comparison. When evaluating game outcomes, alongside the correct answer, how it was found, which evidence was relied upon, and what conclusion the pupil drew must also be taken into account.

CONCLUSION

Designing and applying thinking-development games in

mother tongue and reading literacy lessons allows for the mutual harmonization of primary education's substantive, organizational, and developmental tasks. Didactic games become effective educational tools only when they are designed based on clear pedagogical goals, educational material, cognitive operations, execution rules, and assessment criteria.

As a result of the study, the following conclusions were reached:

In designing thinking-development games, the mutual unity of target, content, procedural, and assessment-reflective components must be ensured.

Game tasks must require the pupil not only to repeat ready-made knowledge, but also to analyze, compare, classify, generalize, identify cause-and-effect relationships, and find creative solutions. The seven-stage algorithm for game design helps the teacher align game content with the lesson goal and pre-determine its developmental potential. In grades 1-4, the complexity of game tasks should be increased step-by-step, taking pupils' individual capabilities into account. In evaluating game effectiveness, alongside the pupil's answer, their thinking process, argumentation ability, capacity to propose alternative solutions, and reflection must also be considered. The main outcome of game technology is not just the pupil's participation in an interesting activity, but the development of independent thinking, problem awareness, and well-founded conclusion-drawing abilities.

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