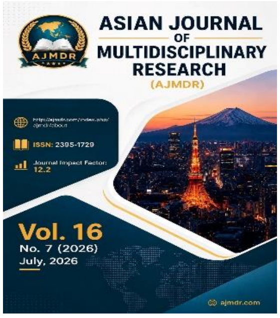
Asian Journal of Multidisciplinary Research
(AJMDR)
ISSN: 2395-1729



A SYSTEM OF DIFFERENTIATED-LEVEL TASKS FOR LEARNERS WITH INTELLECTUAL DISABILITIES IN MATHEMATICS LESSONS WITHIN AN INCLUSIVE EDUCATION ENVIRONMENT

Milena Zhukova
Master’s Student, 2nd Year
NIZAMI NATIONAL STATE UNIVERSITY
UZBEK-BELARUS JOINT FACULTY “INNOVATIVE PEDAGOGY”

Abstract

The development of inclusive education requires the creation of effective pedagogical conditions that enable learners with different educational needs to participate actively in the learning process. Mathematics is one of the subjects in which learners with intellectual disabilities frequently experience significant difficulties due to the abstract nature of mathematical concepts, the need for logical reasoning, working memory, attention, and the sequential processing of information. The purpose of this study is to theoretically substantiate and develop a system of differentiated-level tasks for learners with intellectual disabilities in mathematics lessons conducted within an inclusive education environment. The study employs theoretical analysis of pedagogical, psychological, and methodological literature, comparative analysis of approaches to differentiated instruction, modelling of educational tasks, and pedagogical interpretation of inclusive teaching practices. A three-level system of mathematical tasks is proposed: the basic level, the intermediate level, and the advanced-supported level. The system is based on the principles of individualization, gradual complication, visual support, repetition, practical orientation, accessibility, and continuous formative assessment. The proposed approach allows the teacher to preserve common educational objectives for the whole class while adapting the complexity, volume, form of presentation, and level of assistance to the individual capabilities of each learner. The results of the theoretical analysis demonstrate that differentiated-level tasks can contribute to improved mathematical understanding, learner engagement, independence, and social participation. The study concludes that differentiated instruction should not be understood as lowering educational expectations but as creating flexible pathways for achieving meaningful learning outcomes.

Keywords: inclusive education, intellectual disabilities, mathematics education, differentiated instruction, differentiated tasks, individualization, special educational needs, mathematical competence, formative assessment.

1. Introduction

Contemporary education increasingly recognizes the right of every learner to participate in a high-quality educational process regardless of individual abilities, developmental characteristics, or special educational needs. Inclusive education is based on the principle that learners with disabilities should not be excluded from the general education system and should receive the necessary support within the educational environment.

The development of inclusive education creates new requirements for teachers. A modern classroom may include learners with significantly different levels of knowledge, cognitive abilities, learning pace, communication skills, and educational needs. Consequently, the traditional model in which all learners complete identical tasks at the same time is often insufficient for achieving equitable learning outcomes.

Mathematics represents a particularly important area of inclusive education. Mathematical knowledge is necessary not only for academic achievement but also for everyday independence. Counting money, identifying time, comparing quantities, measuring objects, understanding prices, calculating distances, and solving practical problems are essential skills for participation in social life. For learners with intellectual disabilities, the acquisition of such skills may require more time, repeated practice, visual support, concrete materials, and systematic pedagogical assistance.

Learners with intellectual disabilities may experience difficulties in attention, memory, abstract thinking, generalization, problem-solving, and the transfer of acquired knowledge to new situations. These characteristics do not mean that mathematical learning is impossible. Rather, they indicate the necessity of creating appropriate learning conditions and selecting methods that correspond to the learner's individual capabilities.

In this context, differentiated instruction is one of the most important pedagogical approaches. Differentiation allows teachers to maintain common educational objectives while adapting learning content, task complexity, instructional support, pace, and assessment methods to individual learners.

The relevance of this study is determined by the need to develop practical systems of mathematical tasks that can be used in mixed-ability and inclusive classrooms. A well-designed system of differentiated-level tasks can help the teacher avoid two opposite problems. The first is assigning overly complex tasks that cause frustration and failure among learners with intellectual disabilities. The second is giving excessively simplified tasks that limit cognitive development and reduce opportunities for meaningful participation.

The purpose of this study is to theoretically substantiate a system of differentiated-level tasks for learners with intellectual disabilities in mathematics lessons within an inclusive education environment.

The objectives of the study are:

1. to analyze the pedagogical characteristics of teaching mathematics to learners with intellectual disabilities;

2. to identify the main principles of differentiated instruction in inclusive mathematics education;

3. to develop a three-level system of mathematical tasks;

4. to determine the pedagogical conditions necessary for the effective implementation of differentiated tasks;

5. to formulate methodological recommendations for teachers.

The research question is: How can a system of differentiated-level mathematical tasks support the participation and mathematical development of learners with intellectual disabilities in inclusive classrooms?

2. Materials and Methods

2.1. Research Design

The study uses a theoretical and methodological research design. The research focuses on the analysis and pedagogical modelling of differentiated mathematical tasks intended for learners with intellectual disabilities who study in an inclusive educational environment.

The study does not assume that all learners with intellectual disabilities have identical learning profiles. On the contrary, individual differences in cognitive development, attention, memory, communication, and mathematical experience are considered essential factors in the design of educational tasks.

2.2. Theoretical Analysis

The theoretical analysis focused on the following areas:

- inclusive education;
- differentiated instruction;
- mathematics education for learners with special educational needs;
- individualization of learning;
- visual and concrete learning support;
- formative assessment;
- Universal Design for Learning.

2.3. Pedagogical Modelling

A pedagogical model of differentiated mathematical tasks was developed based on five components:

1. Learning objective – what mathematical skill the learner should acquire;
2. Task complexity – the cognitive and procedural difficulty of the task;
3. Support level – the amount of visual, verbal, material, or teacher assistance;
4. Expected independence – the degree to which the learner completes the task independently;
5. Assessment criteria – the method of determining the learner's progress.

2.4. Principles of Task Design

The proposed system is based on the following principles:

- accessibility;

• gradual progression;

• individualization;

• practical relevance;

• visual support;

• repetition and consolidation;

• active participation;

• positive reinforcement;

• flexibility;

• formative assessment.

The principle of gradual progression is particularly important. A task should be sufficiently challenging to promote development but not so difficult that it becomes inaccessible. Therefore, the teacher should gradually reduce support as the learner gains confidence and competence.

3. Results

3.1. The Three-Level System of Differentiated Mathematical Tasks

The main result of the study is the development of a three-level system of differentiated tasks.

Level 1: Basic Supported Tasks

The first level is intended for learners who require significant support in understanding mathematical concepts and performing operations.

The main characteristics of Level 1 tasks are:

• concrete objects;

• visual images;

• a limited number of elements;

• short and simple instructions;

• repetition;

• teacher modelling;

Asian Journal of Multidisciplinary Research (AJMDR)
ISSN: 2395-1729

• step-by-step guidance;

• immediate feedback.

For example, when teaching addition, the learner may be given real objects such as blocks, pencils, or counters.

Example: There are 2 apples. Add 1 more apple. 2 + 1 = ?

The learner may physically combine the objects and then select the correct number.

At this level, the main objective is not speed but understanding. The learner should gradually connect concrete objects with visual representations and numerical symbols.

A typical task structure may be: Concrete objects → Picture → Number → Mathematical operation.

Level 2: Intermediate Tasks

The second level is intended for learners who have acquired basic mathematical concepts but still require visual or procedural support.

Tasks at this level may include:

• simple calculations;

• comparison of numbers;

• completion of sequences;

• basic word problems;

• classification;

• simple measurement;

• use of diagrams and tables.

Example: A learner has 5 pencils and receives 3 more pencils. How many pencils does the learner have now? 5 + 3 = 8.

The task may be presented with a picture, a number line, or a structured solution plan.

The following algorithm can be used: 1. Identify the initial quantity. 2. Identify

Asian Journal of Multidisciplinary Research (AJMDR)
ISSN: 2395-1729

what has been added. 3. Choose the mathematical operation. 4. Calculate the answer. 5. Check the result.

Level 3: Advanced-Supported Tasks

The third level is intended for learners who demonstrate greater independence and are ready to apply mathematical knowledge in more complex or practical situations.

Tasks may include:

• multi-step problems;

• practical calculations;

• comparison of several quantities;

• independent selection of mathematical operations;

• mathematical reasoning;

• application of knowledge in everyday situations.

Example: A student has 50,000 Uzbek soums. A notebook costs 18,000 soums and a pen costs 7,000 soums. How much money will remain after buying both items?

18,000 + 7,000 = 25,000. 50,000 – 25,000 = 25,000. Answer: 25,000 Uzbek soums remain.

Such tasks are especially valuable because they connect mathematics with everyday life. For learners with intellectual disabilities, practical relevance can increase motivation and support the transfer of mathematical skills beyond the classroom.

3.2. Differentiation of the Same Learning Objective

One of the most important findings of the study is that differentiation does not necessarily require completely different learning objectives.

For example, the common objective may be: “Students will understand addition and apply it to solve a problem.” The same objective can be achieved through different task levels.

Basic: 2 objects + 1 object — concrete objects and teacher modelling.

Intermediate: 5 + 3 = ? — number line and visual support.

Advanced: Solve a practical word problem — minimal support.

Thus, the entire class can work on the same mathematical concept while learners complete tasks that correspond to their individual educational needs.

3.3. Structure of a Differentiated Mathematics Lesson

The proposed system can be integrated into a five-stage lesson structure.

Stage 1. Motivation. The teacher introduces a practical or visual situation.

Stage 2. Common Explanation. The teacher introduces the main mathematical concept to the whole class.

Stage 3. Differentiated Practice. Students receive tasks at different levels.

Stage 4. Collaborative Activity. Students work in pairs or small groups.

Stage 5. Reflection and Assessment. The teacher evaluates accuracy, effort, independence, use of support, and participation.

3.4. Types of Differentiated Mathematical Tasks

1. Matching Tasks. The learner matches number and quantity, picture and word, object and measurement, or mathematical operation and result.

2. Choice Tasks. The learner selects the correct answer from several options.

3. Completion Tasks. The learner completes a sequence such as 2, 4, 6, __, __.

4. Sorting Tasks. The learner sorts objects according to size, shape, number, quantity, or length.

5. Practical Tasks. These connect mathematics to real-life situations such as counting money, telling time, measuring ingredients, comparing prices, calculating quantities, and identifying distances.

4. Discussion

The results of the theoretical analysis demonstrate that a system of differentiated-level tasks can serve as an effective pedagogical mechanism for supporting learners with intellectual disabilities in inclusive mathematics education.

The main advantage of the proposed system is its flexibility. It allows teachers to work toward common learning objectives without expecting all learners to demonstrate achievement through identical tasks.

A second important advantage is the possibility of gradual reduction of support. At the beginning of instruction, the teacher may provide concrete materials, visual prompts, verbal explanations, and step-by-step modelling. As the learner develops competence, some of these supports can be gradually removed.

This process may be represented as: Maximum support → Guided practice → Partial independence → Independent performance.

However, differentiation should not be confused with simplification in the sense of lowering expectations. If learners with intellectual disabilities are consistently provided only with extremely simple tasks, they may have limited opportunities to develop higher levels of independence and problem-solving.

Therefore, the central principle should be: Different pathways, meaningful common goals.

Another important issue is the role of assessment. Traditional assessment often focuses primarily on whether the learner has produced the correct answer. For learners with intellectual disabilities, this approach may not fully reflect educational progress.

For example, a learner may previously have solved a task only with complete teacher assistance but later solve the same task with one visual prompt. This represents meaningful progress even if the mathematical answer remains similar.

Therefore, formative assessment should consider accuracy, independence, level of assistance, time required, ability to transfer knowledge, persistence, and participation.

The use of multiple forms of representation is also important. Visual, concrete, verbal, and practical representations can be combined to improve accessibility.

The findings also demonstrate that collaboration between teachers and specialists is essential. The teacher may require support from special educators, psychologists, speech and language professionals, and families when designing an individualized educational pathway.

The teacher should also observe the learner continuously. A level that is appropriate at the beginning of the school year may become too easy or too difficult over time. Therefore, differentiated tasks should be dynamic rather than fixed.

5. Practical Recommendations for Teachers

1. Begin with the learning objective. The teacher should first identify what the learner needs to understand or be able to do.

2. Divide the task into manageable steps. Complex mathematical problems should be divided into smaller and understandable stages.

3. Use concrete materials. Objects, counters, cards, pictures, number lines, and measuring tools can help learners understand abstract concepts.

4. Use short instructions. Instructions should be clear, concise, and presented one step at a time.

5. Repeat important concepts. Repetition should not be considered a weakness. It is an essential component of learning for many learners with intellectual disabilities.

6. Connect mathematics with real life. Practical contexts such as shopping, cooking, transportation, money, and time can make mathematics more meaningful.

7. Gradually reduce assistance. The teacher should avoid creating permanent dependence on prompts.

8. Use positive feedback. Feedback should focus on progress and effort as well as accuracy.

9. Provide multiple ways to demonstrate understanding. A learner may demonstrate knowledge through oral answers, pointing, selecting, manipulating objects, drawing, writing, or using digital tools.

10. Record individual progress. Teachers should monitor not only grades but also the development of independence and the reduction of support.

6. Limitations of the Study

This study is primarily theoretical and methodological in nature. The proposed system of differentiated-level tasks requires further empirical verification in real inclusive classrooms.

Future research should include experimental studies, classroom observations, teacher interviews, learner progress monitoring, comparison of different instructional models, and analysis of long-term mathematical development.

It is also important to consider that learners with intellectual disabilities represent a heterogeneous group. Therefore, the three-level model should not be applied rigidly. Individual learners may require different combinations of support depending on the specific mathematical skill, learning situation, and developmental characteristics.

7. Conclusion

Inclusive mathematics education requires a flexible and individualized approach to the organization of learning. Learners with intellectual disabilities should not be excluded from meaningful mathematical learning because of difficulties in abstract reasoning, memory, attention, or problem-solving.

The study developed and theoretically substantiated a three-level system of differentiated mathematical tasks consisting of basic supported tasks, intermediate tasks, and advanced-supported tasks. The system allows teachers to preserve common educational objectives while adapting the complexity, volume, presentation, and support level of tasks to individual learner needs.

The central pedagogical value of the proposed system is that it combines accessibility with developmental potential. Learners are not simply given easier tasks; they are provided with appropriate pathways toward meaningful mathematical achievement.

The effectiveness of differentiated instruction depends on several conditions: systematic assessment, gradual progression, visual and concrete support, practical relevance, positive feedback, collaboration, and the gradual development of learner independence.

Consequently, differentiated-level tasks can become an important methodological tool for creating an inclusive mathematics classroom in which every learner is able to participate, make progress, and develop functional mathematical competence.

The fundamental principle of inclusive mathematics education should therefore be: Every learner can learn mathematics when the educational pathway is designed according to the learner's needs, abilities, and potential for development.

References

1. CAST. (2024). CAST Universal Design for Learning Guidelines version 3.0. CAST.

2. Davies, K., & Henderson, P. (2020). Special Educational Needs in Mainstream Schools: Guidance Report. Education Endowment Foundation.

3. United Nations. (2006). Convention on the Rights of Persons with Disabilities. Article 24: Education. United Nations.

4. Tomlinson, C. A. (2014). The Differentiated Classroom: Responding to the Needs of All Learners. 2nd ed. ASCD.

5. Tomlinson, C. A. (2017). How to Differentiate Instruction in Academically Diverse Classrooms. 3rd ed. ASCD.

6. UNESCO. (2020). Global Education Monitoring Report 2020: Inclusion and Education: All Means All. UNESCO.

7. Florian, L. (2014). What counts as evidence of inclusive education? European Journal of Special Needs Education, 29(3), 286–294.

8. Rose, D. H., & Meyer, A. (2002). Teaching Every Student in the Digital Age: Universal Design for Learning. ASCD.

9. Ainscow, M. (2020). Promoting inclusion and equity in education: Lessons from international experiences. Nordic Journal of Studies in Educational Policy, 6(1), 7–16.

10. Mitchell, D. (2014). What Really Works in Special and Inclusive Education: Using Evidence-Based Teaching Strategies. Routledge.