

# Didactic Aspects of Teachers' Training for Differentiated Instruction in Modern School Practice in Ukraine

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**Abstract.** The paper describes modern approaches and principles for implementing differentiated instruction in school teaching and learning. New expectations of qualitative changes in school education depend on teachers' personal and professional roles in this process. The paper reveals the core characteristics of "differentiated instruction" and its functions in teaching. The authors consider "differentiated instruction" to increase the efficiency of education; as the means of individualized learning; as the educational principle; as a method to ensure cognitive students' activities; as the technology for learning activities in different student groups. The main idea of research is to identify the appropriate pedagogical conditions to ensure the effectiveness of improving teachers' mastery in differentiated instruction implementation. Specifically, this study examines English teachers' use of differentiated instruction in school and explores the empirical results of their training in Ukraine. The authors suggest the ways to improve the content, organizational and technological components of teachers' training for differentiated instruction in modern school practice.

**Keywords:** teacher's training; differentiated instruction; learning and teaching; school, methods and techniques

## 1. Introduction

The activation of democratic processes in global society has led to reconsider approaches and education principles in a new school. The psychological characteristics of school students and teachers' professional activities should

create relevant conditions for developing the students' values and ideals, enhancing learning progress, self-revelation, and readiness for an active life position. The new school requires teachers who can effectively apply the innovative techniques and methods, have a high level of pedagogical mastery, perform professional duties based on democratic and humanistic principles, and are ready for creative practice (OECD, 2018). Teachers should turn to the model of differentiated instruction to meet the educational needs of all students. As far back as the 17th century, John Amos Comenius, the father of modern education, emphasized that "children should perform those activities that correspond to their age and skills" (Comenius, 1896). Differentiated instruction challenges learners to make decisions, take responsibility for their learning, and allows them to demonstrate unique advantages, interests, and strengths of knowledge. The teacher plans and adapts teaching according to the individual students' needs, focuses on relevant pedagogical situations, and believes in each student's learning success. Differentiated instruction differs from the traditional one by strengthening individual students' development in accordance with their unique attributes. The decisive factor in implementing differentiated instruction in school practice is the teachers' mastery and readiness for its quality. The authors believe that effective teachers' training for differentiated instruction is necessary to meet students' varied needs and teaching personnel. The differentiated learning is a complex process that reveals the students' individuality, develops their educational potential (psychological aspect), and educational self-regulation (pedagogical aspect). Differentiation is a decisive factor in reviving the cultural and creative function of secondary education, humanization, and the education process's democratization. It provides for the full development of children with different levels of skills.

The *purpose* of the study is to identify the appropriate pedagogical conditions to ensure the effectiveness of improving teachers' mastery in differentiated instruction implementation. Specifically, this study examines English teachers' use of differentiated instruction in school and explores the empirical results of their training in Ukraine.

## 2. Literature Review

In scientific researches, scholars discuss new approaches and principles to organizing differentiated instruction, in particular, to provide an individual educational trajectory for students' development by their personal needs, interests, and aptitudes, to develop and support teaching talents. While researching, we have taken into account various scientific resources. Scholars select manuscripts that are to be involved in the study's theoretical framework exceptionally carefully since its success depends on the originality and authenticity of these chosen ones. We analyzed many outstanding scholars' works to cover the problem of implementing differentiated instruction in school practice. Thus, theoretical framework of our study is based on works by such scholars as: Comenius (1896) (differentiation as a didactic principle), Gregory and Chapman (2013), Heacox (2001), Holloway (2000) (differentiated instruction as a philosophy of teaching, complex concept), Kennedy (1999), Burton (2003), Roberts and Inman (2007), Coffey (2007), Glazzard et al. (2019) (the phenomenon

of classroom differentiation in theory and practice), Tomlinson (1999; 2000; 2003; 2005) (fundamental considerations in diversity, standards-based teaching and differentiation), Babbage, Byers and Redding (1999), Henderson (2006), Oaksford and Jones (2001), Newby (2005), Holloway (2000) (preparing and improving teachers' pedagogical mastery through advanced training, self-education and self-development for planning effectively differentiated learning), Heacox (2001), Pozas and Schneider (2019) (some aspects of using differentiated instructional strategies in inclusive education), Kupchyk and Litvinchuk (2020), Steele (2006), Jennek, Gronostaj and Vock (2019) (content and technological provision of teachers' readiness for differentiated instruction in classroom, as well as modeling the system of differentiated teachers' training).

According to Brimijoin et al. (2003), differentiated instruction aims to develop each student's interests and talents, enhancing their creative and intellectual potential. Scholars agree that the concept of differentiation by its very nature is narrower than individualization (differentiation by gender, age characteristics, geographical features, etc.).

Of great importance are research findings by the American scholar Bloom (1956), who distinguished three categories of learners: slow learners (35%), high-ability learners (5%), and ordinary learners (60%). He noted that the education process organization in American elementary schools, especially for high-ability students, is based on a differentiated approach and differentiated programs (10–20 levels of differentiation). However, experience shows that younger students acquire the proposed content in different ways. In this regard, differentiated instruction contributes to eliminating the “average student” stereotype. Accordingly, there are schools (classes) for students with different educational abilities and interests: interested, capable and diligent students, who are often called “gifted;” students with average educational skills (the majority of them); students with special needs. Simultaneously, students' rigorous differentiation and subsequent involvement in the activities based on specific content and teaching methods have significant pedagogical advantages and disadvantages (paid education, the examination system) (Bloom, 1956). Enriching classes with complex educational material enhance the activation and development of talented students. However, the facts these students prefer elite schools and lyceum classes somehow affect the atmosphere in regular courses, and not in the right way. If there are no “stars,” namely, talented students in a class, other students have no one to compare themselves. Besides, teachers may lose interest in what they do as well.

To efficiently differentiate student activities, Heacox (2001) developed two matrices to help teachers differentiate using Bloom's Taxonomy. With Bloom's Taxonomy, the complexity of the tasks increases as one moves through the six levels. These six levels are: (a) knowledge or basic facts and information, (b) comprehension or understanding the: information, (c) application or utilizing the data, (d) analysis or examining the data, (e) synthesis or formulating new ideas based on the data, and (f) evaluation or judging the value of the data. When differentiating instruction, a teacher can create activities of different

complexities based upon a student's readiness and Bloom's Taxonomy. A struggling student may need additional practice and complete activities at the first two levels, while an advanced student may work at the final level and combine prior learning and the new learning.

One more important problem concerns the use of differentiated instruction in classes of students with special educational needs. Glazzard (2016) examined the barriers to inclusion in primary school and stated that some teachers worked in good faith to develop the integration for special educational needs. Others displayed negative attitudes towards these pupils, which negatively impacted the school's commitment to inclusion. To his mind, the lack of teachers' training is a crucial barrier to integration. Glazzard et al. (2019) propose practical recommendations and strategies (case-study, reflective tasks, "picture exchange communication system," "visual timetables," "social stories, and comic strips") in teaching and supporting children with special educational needs in primary schools. Considerable attention is paid to some aspects: individual teaching, group learning, and classroom environment.

As evidenced by many research types, classroom differentiation is highly dependent on positive teachers' behavioral changes in core areas. Studying mathematics and science programs, Kennedy (1999) proved that teachers use strategies related to the content that show their students' results. Thus, differentiation is a modified instruction that helps students with diverse academic needs and learning styles master the same educational content (Bearne, 1996; Bender, 2005).

To facilitate school teachers' learning decisions, Pozas and Schneider (2019) propose a systematic practice, trying to bridge the gap between theory and everyday learning practice. The taxonomy provides teachers with practical and specific advice on the differentiation of their learning to overcome diversity in the classroom. The taxonomy of practice has several steps: tiered assignments, tutoring systems within the learning group, step-by-step non-verbal textbooks, masterful learning, open education/granting autonomy to students, careful monitoring of students' achievement.

According to Tomlinson (1999; 2000; 2003; 2005), educators need to find an appropriate match between diversity in students' characteristics and the curriculum to be assessed to become more responsive practitioners. Scholar believes that understanding each student's capabilities increases the student's motivation to learn. The teacher should know that differentiation is not a guarantee of instant achievement of the same level of all students. The level of opportunities that will increase learning outcomes will be better, but not the same. Therefore, it is imperative to widely consider diversity and study teachers' experiences in different contexts. In its broadest meaning, scholars define differentiation as "a philosophy of teaching purporting that students learn best when their teachers effectively address the variance in students' readiness levels, interests, and learning preferences" (Tomlinson, 2005, p. 263).

Indeed, it is difficult for trainee teachers to differentiate students' learning (Henderson, 2006). Many teachers are not very successful in the practical use of differentiation in school (Babbage, Byers, Redding, 1999). According to O'Brien (2000), Oaksford and Jones (2001), planning effectively for differentiated instruction teachers should consider four interactive elements: pedagogical, emotional, cognitive, and social.

Carolan and Guinn (2007, p. 46) identified four characteristics of effective differentiation in practice. They include the following elements: personalized scaffolding to support learners in bridging the gap between learner's needs to complete the tasks; using flexible means to reach defined results by offering multiple paths to achieve set goals; "mining subject area expertise" by using various navigations; creating caring classrooms that acknowledge and value the unique learner's attributes. Spanou and Zafiri (2019) proposed the ways of applying differentiation via the implementation of information technologies.

The analyzed studies on the outlined problem indicate an inadequate level of its theoretical and practical justification. In particular, the issues of content and technological provision of teachers' readiness for differentiated instruction, as well as the process of its modeling, are open for discussion.

### 3. Methodology of Research

In our research, we used various methods: theoretical (analysis and summary of philosophical, psycho-pedagogical and methodical literature, interpretation, deduction and induction, generalization, systematization, modeling) to justify the methodological principles, concepts, and terminology; to develop a model of teachers' training for differentiated instruction and an algorithm for its methodological implementation; empirical diagnostic methods (interviews, questionnaires, tests, observations, ranking) to verify the effectiveness of the developed model; experimental methods (search, ascertaining, formative, control stages); statistical methods (quantitative and qualitative analysis of experimental data), methods of mathematical statistics to assess the reliability of the obtained results of the pedagogical experiment. The empirical basis of the research includes the results of the survey of 408 English teachers from Ukraine (the experimental (EG) and control (CG) groups (204 teachers per each)).

The following scientific approaches underlie the research: axiological, systemic, humanistic, personality-oriented, communicative, activity-based, subjective, interdisciplinary, and competency-based). The effectiveness of teachers' training for differentiated instruction depends on essential educational principles: continuity, self-education, self-determination, self-correction, the actualization of learning outcomes, joint activities, creative thinking.

The analysis of scientific sources and teachers' training for differentiated instruction is not sufficiently justified in pedagogical theory and practice of education. Simultaneously, there are some *contradictions* in the practical aspect of the problem that must be resolved, such as: between new schools' expectations of qualitative changes in the education process and teachers' insufficient

comprehension of their personal and professional role in this process; between high requirements of new schools for teachers' professionalism and an inadequate level of their preparation for systematic and effective implementation of differentiated instruction; between the need to improve teachers' training as regards differentiated instruction and the lack of appropriate pedagogical conditions to ensure the effectiveness of this process. Contradictions correspond to the analysis of teachers' experience in differentiated instruction, the state of teachers' training for using it in practice, and the opportunities of the educational process in a new school.

Pedagogical determinants for the teacher's professionalism in differentiation instruction include enriching self-study content and motivation to gain individual experience of self-reflection. The practical implementation of the author's methodological contributions involves ensuring positive dynamics in the determining conditions of the teachers' training for differentiated instruction.

On the bases of scholars' interpreting the concept of "differentiated instruction", the authors' generalized core characteristics of this phenomenon: 1) *the way* to increase the efficiency of the education process; 2) *the form and means* of teaching individualization; 3) *the academic principle* according to which a complex of educational conditions is created taking into account typological features of students and the goals and the content of education, teaching forms and methods are selected and differentiated; 4) *the way* to ensure maximum productive educational and cognitive activities of students based on the subject-subject interaction; 4) *the technology* for organizing the individual learning, which takes into account the interests and aptitudes; 5) *the system* of instruction based on differentiation.

#### **4. Findings and Discussion**

Analysis of specificity in teachers' training has shown that effective implementation of differentiated instruction in secondary education requires a reconsideration of teachers' postgraduate education's organizational, content, and technological components. The content of training courses for teachers needs to update and focus on achieving a new school's education standards. Based on the teachers' training, we found insufficient attention to the need to enhance their motivation to master differentiated instruction strategies. Most teachers are interested in implementing differentiated instruction in school, but not all are ready for this educational activity. Indeed, the teachers' training for differentiated instruction is unsystematic and inconsistent. Fragmental information on various aspects of differentiated instruction and its potential resources, lack of specialized knowledge, skills, and practical experience in implementing differentiated instruction caused the need to improve teachers' training in the context of differentiated instruction in secondary education.

Some factors influence the effectiveness of teachers' training for differentiated instruction: *socioeconomic* (fostering teachers' creativity and professional self-development due to modern training facilities; enhancing the prestige of the

teaching profession; providing financial support for teachers' professional development, etc.) and *psycho-pedagogical* (motivation and stimulation, creating favorable psychological and pedagogical conditions for teachers' professional development, promoting research activities and leading educational innovations, etc.).

Due to the analysis of scientific sources, the authors determined that teachers' training for differentiated instruction is a systematic process aimed at improving professional knowledge, mastering pedagogical skills, developing motivations, and enriching educational experience using differentiated instruction. Consequently, preparation for the specific professional pedagogical activity, in particular, differentiated instruction in school is, on the one hand, a crucial component for teacher training and, on the other hand, it's an essential outcome.

The authors consider differentiated instruction as the educational process which provides conditions for students' realization in cognitive activities, enhancing their value orientations, self-awareness, self-affirmation, taking into account their psychological characteristics that encompass the whole system of their behavior. The main factors in effective implementation of differentiated instruction are individual peculiarities of students, teachers' mastery, instruction content, procedural support for differentiated instruction, educational and methodological support, school facilities, student groups, administrative management. Therefore, teachers are to engage all students in educational activities to reveal their talents and capabilities. Moreover, they should be ready to find new teaching strategies (content, goals, and structure of English lessons), developing differentiated tasks, correcting students' achievements, determining their needs, fostering their differentiation skills (EL Education, 2020).

The realization of such a task needs teachers' well-developed system of professional motivation toward differentiated instruction implementation based on humanism and child-centrism. Kupchyk and Litvinchuk (2020) recommended the practical approaches and methods to improve foreign language instruction at tertiary schools.

A wide range of teachers' professional functions requires constant improvement of their mastery through advanced training, self-education, and self-development. A continuing creative professional and personal growth presents teachers with the opportunity to improve their acquired profound knowledge, develop their qualities and skills required to master their professional competence, and become proficient at a pedagogical activity. Therefore, teachers' training for differentiated instruction must be carried out based on the practical application of educational technologies to use the professional experience of a well-developed personality. It's essential for developing students' skills to navigate and critically analyze information, synthesize, and store the retrieved sources. As Newby (2005) summarized, learners should be taught discovering things, identifying them, and packaging differently to use them in more comprehensive and diverse forms with different functions. Teachers need to provide for effective education of students within a changing

educational landscape, with a different emphasis on particular skills, requiring the provision of a specific pedagogy for creating inclusive classrooms. It is essential to discuss with teachers and students their preexisting expectations. It is necessary to talk with teachers and students about their previous expectations for differentiated learning, as well as to agree on the goals of the curriculum and diagnostic tools (Biggs, 2001).

Subjective and objective difficulties may occur during differentiated instruction implementation into the education process. They are the lack of differentiated knowledge and skills; choosing optimal differentiated methods and techniques; inconsistency between tasks for different levels of differentiation in textbooks; insufficient number of study hours allocated for complex material; unnecessary information overload in books; lack of modern methodological developments on differentiated instruction; and inadequate role of administration in introducing new achievements of pedagogy and differentiated instruction; the lack of individual courses on using methodological approaches or techniques of differentiated instruction within advanced training programs.

To implement differentiated instruction, teachers should define students' general readiness to engage in educational and cognitive activities and perceive specific material. Moreover, teachers should anticipate the difficulties students may have while mastering new learning information; apply differentiated individual and group tasks; analyze the tasks planned at different stages of the lessons. A differentiated group activity is the most effective. Thus, students can freely express their thoughts, take an active part in solving educational assignments following their interests and abilities. Students want to work with classmates who have similar interests, work style, and friends (Granås, 2019).

To help teachers understand the differentiation, Campbell et al. (2003) created a useful framework to encourage them in this process. The teachers can be successful if they consistently apply different activities, subject areas, attitudes toward differences in students' background factors (differences in the teaching of students of different ages, abilities, genders, social and economic background, ethnicity, etc.). It is essential to consider students' cognitive and learning styles, motivation, self-esteem, cultural traditions, unique individual needs for self-learning. The critical question and issue here, therefore, becomes "at what point in the trainees' development are they able to take on these issues and fundamentally, can they afford not to?" (Campbell, 2003).

It is essential to disseminate the best pedagogical international experience, representing the examples of the best teaching practices and describes criteria for identifying the levels of teachers' competence for differentiated instruction. We found that group differentiation has different variants. It depends on the particular programs and educational tasks (Germany); studying specific subjects (France); students' abilities (UK). According to the dividing students into groups, it causes competition between them (Japan). Group instruction is pedagogically justified in general. However, there is always a possibility of narrowing the general outlook of the students who work in a group. When

dividing students into bright and weak, it's necessary to pay attention either to vulnerable students or strong ones. Both options can be detrimental to one or another student group (Deunk et al., 2018).

Considering different students' cognitive activities is essential to develop combined differentiated tasks for students with special educational needs. However, such tasks' main aim is to ensure optimal educational and cognitive activities for each student. For this matter, different tasks were used to increase students' level of program acquisition, since the paces of advancing were qualitative students' characteristics.

The implementation of differentiated instruction involves several stages: defining the criteria; performing diagnostics based on the selected criteria (multi-level tests are the most effective); dividing students into groups; defining methods and techniques of differentiation, developing differentiated tasks; implementing differentiated approach at different stages of the lesson; diagnosing control over the results. The criteria that define the suitability of using differentiated instruction can be erudition and educational abilities.

We share scholars' (Suprayogi, Valcke & Godwin, 2017) opinion regarding the need to define the particular conditions that contribute to active using differentiated instruction. The scholar proposes to systematically apply the differentiated tasks, taking into account the lesson's aim, the effectiveness of assignments, students' readiness, and ability to anticipate the difficulties. It's essential to organize the necessary verification of completed tasks. Moreover, the creation of differentiated instruction would ensure identical conditions for all students so that a weak student could proceed to a more complex task.

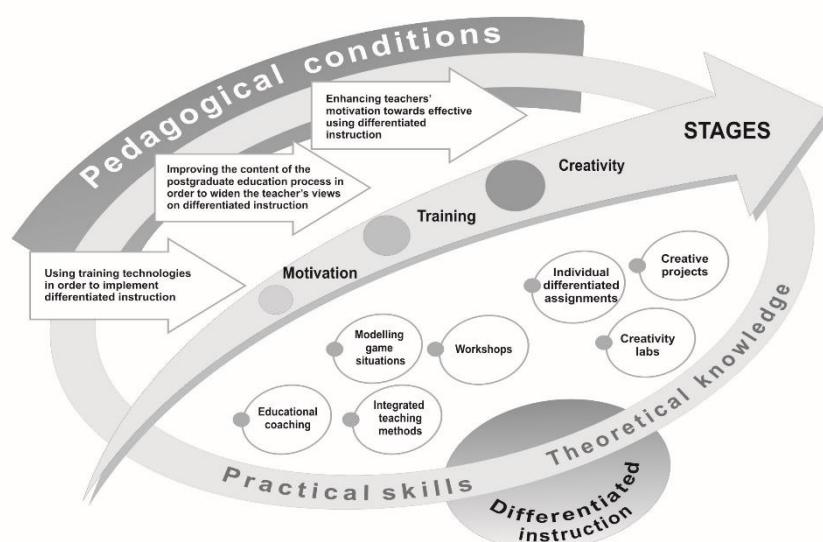
In this increasingly personalized learning context, teachers should understand "how to learn," "how to think," "how to create," "how to reflect" in their teaching. Jackson and Evans (2017) research findings show that teachers also have to be theoretically informed and aware of individual learning differences to involve every student in the co-construction teaching and learning process. Teachers should acknowledge and develop their approaches and teaching styles, which would fit the curricular call to focus more on what beginning teachers need to know (Jackson & Evans, 2017).

Existing practice shows that among methods and techniques of differentiated instruction teachers apply differentiation according to *complexity of tasks* (selection of the functions that require different generalizations and conclusions, are designed for varying levels of activity, increasing complexity, reproductive and creative nature), *autonomy level* (selection of tasks with an identical level of complexity, but different degrees of assistance; accessibility and variation of information for independent range), *volume* (variety of tasks with similar content, but differentiated by time for its completion, additional tasks (educational games, etc.)); *the level of creativity and logical thinking development* (selection of original based on students' cognitive activity); *assistance* (dispensing assistance to students through additional tasks, preparatory exercises, hints,

visualization), *educational actions* (selection and performance of functions in accordance with substantive, perceptual and intellectual actions). The range of tasks based on their volume is the most affordable option for students since they choose only those tasks they can complete. This way of differentiation is the simplest one. It is possible to use the differentiation at several stages of the lesson, such as explaining a new topic, to ensure an individual pace for students' advancement.

Differentiated instruction requires profound teachers' theoretical knowledge and well-developed practical skills and abilities, readiness for using differentiation, pedagogical intuition, improvisation, reflection, and striving for continuing professional self-development. We justified *educational conditions* for successful teachers' training for differentiated instruction. They are the following: enhancing teachers' motivation towards active using differentiated instruction; improving the content of the education to widen the teachers' views on differentiated instruction; using training technologies and tools to implement differentiated instruction.

When organizing advanced training programs for teachers, we designed and implemented a model (see Figure 1).



**Figure 1: The authors' model of teachers' training for differentiated instruction**

An experimental study confirmed the effectiveness of the designed model application. During the formative stage of the experiment, the criteria, indicators, and levels of students' readiness for differentiated instruction, we diagnosed the level of teachers' training required to conduct differentiated instruction. Based on the analysis of the results of the formative experiment, we found that most teachers (CG – 22.30%, EG – 21.99%) were at a low level of readiness for differentiated instruction, whereas 47.62% of CG participants and 46.28% of EG participants were at sufficient one. However, only 30.08% of CG participants and 32.47% of EG participants were at a high level of readiness for differentiated instruction.

Quantitative and qualitative analysis of the obtained diagnostic data showed that it was expedient to introduce the designed model at the experiment's formative stage. At this stage, we activated teachers' motivation toward the active use of differentiated instruction by involving them to work in creative labs on preparing the presentation ("This is how I do it ...") and participate in a specially organized online seminar on "Organizing Teachers Creative Activities." Pedagogical coaching, webinars, online forums, online consultations, etc. were useful for teachers. Problem-based interactive teaching methods have proved to be somewhat valuable, namely, the educational game "New Format of Differentiated Instruction," various types of discussions ("Synthesis of Thoughts," "The Carpet of Ideas," "Macro- and Micro-Structure of Different Forms of the Education Process Organization in New School," "Methodical Harvesting" etc.). Teachers were offered individualized differentiated tasks and cases with a specified number of points for their performance: compiling tests to identify the level of knowledge acquired in the course; drawing algorithms of students' educational activities and providing instructions; conducting mini-studies; creating one's website, blog, etc. Among effective methods, we can distinguish independent work, modeling situations, individual tasks, creative projects ("Differentiating the Schooling Education Practice," "Instruction Differentiation and Individualization in Secondary School: New Experience,") interactive exercises, brainstorming ("Interest in Differentiated Instruction,") "diving" into a professional environment, round table, reflective tasks. Teachers trained to use innovative open resources (online learning platforms and tools) "Quizlet," "Nearpod," "Kahoot," "Canvas," "Google Classroom," "EdPuzzle," "FlipGrid". These learning tools allow creating differentiated English lessons through the use of smartphones and computers responsibly.

**Table 1: The dynamics of EG and CG teachers' readiness levels based on indicators of the motivational criterion (%)**

| Indicators                                                  | Levels     | CGs<br>(204 participants) |                      | EGs<br>(204 participants) |                      |
|-------------------------------------------------------------|------------|---------------------------|----------------------|---------------------------|----------------------|
|                                                             |            | Before the experiment     | After the experiment | Before the experiment     | After the experiment |
| Motivation toward differentiated instruction implementation | low        | 39.2                      | 33.6                 | 38.7                      | 12.9                 |
|                                                             | sufficient | 35.3                      | 36.8                 | 35.3                      | 39.3                 |
|                                                             | high       | 25.5                      | 29.6                 | 26.0                      | 47.8                 |
| Motivation toward effective professional performance        | low        | 40.7                      | 34.7                 | 41.2                      | 15.5                 |
|                                                             | sufficient | 37.3                      | 40.7                 | 36.3                      | 41.7                 |
|                                                             | high       | 22.0                      | 24.6                 | 28.4                      | 42.8                 |
| Motivation toward pedagogical achievements                  | low        | 29.9                      | 22.8                 | 29.9                      | 8.5                  |
|                                                             | sufficient | 42.1                      | 45.0                 | 41.7                      | 44.3                 |
|                                                             | high       | 28.0                      | 32.2                 | 28.4                      | 47.2                 |
| Value orientations,                                         | low        | 25.0                      | 20.0                 | 26.5                      | 8.3                  |

|                                                |            |      |      |      |      |
|------------------------------------------------|------------|------|------|------|------|
| the need for knowledge, creativity development | sufficient | 45.1 | 46.2 | 44.1 | 42.9 |
|                                                | high       | 29.9 | 33.8 | 29.4 | 48.8 |

The transformations in teachers' motivation fixed the pedagogical mastery changes, practical skills performance, value orientations, needs for knowledge, and creativity. The respective levels for each indicator included comparing these levels in teachers in EG and CG before and after the formative experiment.

While implementing the research program, it was possible to ensure EG participants' positive attitude toward differentiated instruction. Table 1 presents the number of EG teachers with a high creative level of motivation toward differentiated instruction, which increased by 21.8%, while in CG – by only 4.1%.

We used a questionnaire during the pedagogical experiment's formative stage to identify differentiated content teachers' knowledge. The results showed an increase in teachers' theoretical, methodological, and applied knowledge of differentiated instruction. Substantial changes were among EG teachers and less significant among CG teachers. The dynamics of teachers' readiness levels based on the content and gnostic criterion indicators are in Table 2.

**Table 2: The dynamics of EG and CG teachers' readiness levels based on indicators of the content and the gnostic criterion (%)**

| Indicators                                       | Levels     | CGs<br>(204 participants) |                      | EGs<br>(204 participants) |                      |
|--------------------------------------------------|------------|---------------------------|----------------------|---------------------------|----------------------|
|                                                  |            | Before the experiment     | After the experiment | Before the experiment     | After the experiment |
| Theoretical knowledge                            | low        | 16.2                      | 14.5                 | 15.7                      | 6.8                  |
|                                                  | sufficient | 49.0                      | 50.2                 | 49.0                      | 45.3                 |
|                                                  | high       | 34.8                      | 35.3                 | 35.3                      | 47.9                 |
| Possession of relevant information               | low        | 17.7                      | 14.4                 | 18.6                      | 8.0                  |
|                                                  | sufficient | 49.5                      | 52.0                 | 49.0                      | 47.7                 |
|                                                  | high       | 32.8                      | 33.6                 | 32.3                      | 44.3                 |
| Understanding of professional concepts and views | low        | 18.1                      | 13.9                 | 17.7                      | 3.7                  |
|                                                  | sufficient | 48.5                      | 50.9                 | 48.5                      | 51.0                 |
|                                                  | high       | 33.4                      | 35.2                 | 33.8                      | 45.3                 |

As evidenced from Table 2, EG teachers increased their knowledge of the content of pedagogical differentiation, differentiated approach to instruction, and found out about differentiation levels. The implementation of the experimental directive into EG teachers showed the difference between the individual and differentiated approach to education (the indicator in EG has increased by 12.6%, whereas in CG – by only 0.5%). A high creative level of possession of relevant information in EG teachers increased, too. The indicator increased by 12.0% (from 32.3% before the experiment to 44.3% after the experiment). Instead, CG teachers' knowledge grew by 0.8% (32.8% – before the experiment, 33.6% – after the experiment). The pedagogical experiment's formative stage of the showed that CG teachers' understanding of professional concepts and views increased from 33.4% to 35.2%. Simultaneously, this

indicator in EG teachers increased by 15.5% (from 33.8% to 45.3%). The research findings proved that the number of EG teachers with a high level of development of the content and gnostic component increased during the formative experiment. An important indicator of research effectiveness was a decrease in the number of EG teachers with a low level of the development of the theoretical components by 11,2%. In CGs, the number of teachers with a low level decreased by 3.1%.

The level of activity-based and creative development based on teachers' ability to identify differentiated features of educational material, the ability to apply differentiated knowledge to perform complex practical tasks; and skills required to differentiate the acquired knowledge. The criteria for evaluating professional skills were the number of actions, the sequence of operations, quality of each activity, the time used to perform the actions.

Table 3 presents the dynamics of teachers' readiness levels for differentiated instruction based on activity-based and creative development indicators. According to the data presented in the table, we concluded that only 31.9% of EG teachers and 30.9% of CG teachers were at a high level of readiness based on the first indicator (active use of differentiated instruction) before the experiment. After the proposed model of teachers' training for differentiated instruction, these high-level indicators changed by 11.0% in EG and only by 0.5% in CG. The following changes occurred: 52.4% of EG teachers and 54.4% of CG teachers were at a sufficient level of readiness before the experiment and after the investigation – 52.9% and 55.7% of EG, respectively. Subsequently, 14.7% of CG teachers and 15.7% of EG teachers were at a low readiness level based on the first indicator before the experiment. After the investigation – 4.2% of EG teachers and approximately 12.0% of CG teachers, respectively.

**Table 3: The dynamics of EG and CG teachers' readiness levels based on indicators of the activity-based and creative criterion (%)**

| Indicators                                                                                           | Levels     | CGs<br>(204 participants) |                         | EGs<br>(204 participants) |                         |
|------------------------------------------------------------------------------------------------------|------------|---------------------------|-------------------------|---------------------------|-------------------------|
|                                                                                                      |            | Before the<br>experiment  | After the<br>experiment | Before the<br>experiment  | After the<br>experiment |
| Active participation, organization and implementation of lessons based on differentiated instruction | low        | 14.7                      | 12.0                    | 15.7                      | 4.2                     |
|                                                                                                      | sufficient | 54.4                      | 55.7                    | 52.4                      | 52.9                    |
|                                                                                                      | high       | 30.9                      | 32.3                    | 31.9                      | 42.9                    |
| Acquisition of education knowledge, use of innovative methods and technologies                       | low        | 16.2                      | 13.3                    | 15.2                      | 3.9                     |
|                                                                                                      | sufficient | 53.4                      | 54.8                    | 54.4                      | 55.1                    |
|                                                                                                      | high       | 30.4                      | 31.9                    | 30.4                      | 41.0                    |
| Creative activities, creativity, pedagogical mastery                                                 | low        | 16.7                      | 15.6                    | 17.6                      | 7.9                     |
|                                                                                                      | sufficient | 53.9                      | 54.1                    | 51.5                      | 53.2                    |
|                                                                                                      | high       | 29.4                      | 30.3                    | 30.9                      | 38.9                    |

Positive changes in the teachers' ability to apply differentiated instruction after the experiment indicated a significantly higher level in EG compared to CG teachers. The results showed that the number of EG teachers who were at a high level increased by 11,9%, the number of CG teachers – by 1,1%. The number of teachers at a sufficient level increased in both groups: by 1.0% in EG and by 0.95% in CG. The number of teachers at a low level was also different: in EG, it decreased by 10.8%, in CG – by 2.2%.

The diagnostics results also documented positive changes in teachers' creative activities, creativity, and pedagogical mastery. Based on the initial data, 22.1% of EG teachers and 20% of CG teachers had high results. The increase in the data from the final testing in EGs was significantly higher (20.8%) than in CGs (3.9%). The number of EG teachers who were at a sufficient level of readiness increased by 20.4% after the formative experiment. They can analyze their activities, which contributes to developing one's "self". In CG, the number of teachers who were at a sufficient level increased by only 3.1%.

Table 4. presents general descriptions of teachers' readiness levels for differentiated instruction before and after the experiment.

**Table 4: General dynamics in teachers' readiness levels for differentiated instruction before and after the experiment(%).**

| Groups of teachers | Levels     | Criteria                     |       |                     |       |                             |       |
|--------------------|------------|------------------------------|-------|---------------------|-------|-----------------------------|-------|
|                    |            | Motivational and axiological |       | Content and gnostic |       | Activity-based and creative |       |
|                    |            | 1                            | 2     | 1                   | 2     | 1                           | 2     |
| CG,<br>n = 204     | low        | 33.7                         | 27.7  | 17.33               | 14.27 | 15.87                       | 13.63 |
|                    | sufficient | 39.95                        | 42.2  | 49.00               | 51.03 | 53.9                        | 54.87 |
|                    | high       | 26.35                        | 30.1  | 33.67               | 24.70 | 30.23                       | 31.50 |
| EG,<br>n = 204     | low        | 34.07                        | 11.30 | 17.33               | 6.17  | 16.17                       | 5.33  |
|                    | sufficient | 39.35                        | 42.05 | 48.83               | 48.00 | 52.77                       | 53.73 |
|                    | high       | 26.58                        | 46.65 | 33.84               | 45.83 | 31.07                       | 40.94 |

Note 1 – before the experiment, 2 – after the experiment.

The experiment results show the outlined levels of teachers' readiness for differentiated instruction. The number of EG teachers at a high level increased by 13.97% (from 30.50% to 44.47%), and in CG – by 1.02% (from 30.08 to 32.10%). The number of EG teachers who were at a sufficient level of readiness for differentiated instruction increased by 0.95% (from 46.98% to 47.93%), whereas the number of CG teachers increased by 1.75% (from 47.62 to 49.37%). The most significant changes observed at a low level: in EG, the number of teachers at a low level decreased by 14.92% (from 22,52% to 7.60%), in CG – by only 3,77% (from 22,30% to 18.53%). The statistical validity of differences in the levels of EG and CG teachers' readiness for differentiated instruction was verified by the Xi-square statistics, which applied to any patterns of independent samples, the volume of which should be no less than 30 (Rudenko, 2012, pp. 206–208). Before the experiment, it was a significant difference in indicators of EG and CGs, which proved its validity.

The results show that numerical values of readiness levels in EGs differ significantly from those in CGs, and this discrepancy is not accidental. It is obvious the influence of both experimental methodology and model. Expert assessment methods confirm the effectiveness of the proposed model.

## 5. Conclusions

Under the conditions of reforming education (diversifying and enhancing education quality in school, developing students' attributes, and motivating them toward self-cognition and self-development), teachers' requirements for pedagogical activity and personality traits are changing. Teachers should be a source of cognitive and moral growth for their students. Students' educational progress can be ensured only through coordinated educational activities, enhancing high-level moral and ethical interaction, applying innovative educational technologies. Among the demands put forward by the new school system for teacher personality, the following moral qualities needed for implementing differentiated instruction: love for teaching, general culture, justice, tolerance, honesty, dedication, caring attitude. Therefore, their professional activity includes well-developed psychological and methodical skills, masterly, social responsibility, and the ability to generate new ideas and implement innovations, self-reflection, and creative self-realization. To effectively implement differentiated instruction ideas in secondary education, it is necessary to reconsider organizational, content, and technological components of teachers' training. In particular, the content of teachers' training needs updating to relevant school education standards. Teachers' readiness for differentiated instruction is the unity of motivational, cognitive, and procedural components, ensuring the effectiveness of secondary education. The experiment results confirmed the validity and effectiveness of the proposed model in teachers' training for differentiated instruction. The perspective of further research concerns the training of subject teachers and school leaders in providing differentiated instruction at all stages of school education. In future studies, the problem of using differentiated instruction for the development of learner's self-educational activity and independent cognitive activity may be interesting.

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