

## **REVIEW**

by Prof. Dr. Snezhana Hristova Nikolova, Shumen University „Bishop K. Preslavski”  
of a dissertation work on the topic „**Teaching mathematics to students with mild  
intellectual disability in secondary school level**”  
for the awarding of an educational and scientific degree „doctor” in the field of higher  
education 1. Pedagogical sciences, professional field 1.2. Pedagogy, Doctoral program  
„Special Education” (in English)

**PhD candidate: Panagiotis-Christos Konstantinos Trichas**

**Supervisor: Prof. DSc Milen Zamfirov**

### **General presentation of the procedure**

By order of the Rector of the Sofia University „St. Kliment Ohridski” No. RD 38-222/ 28.04.2023 I have been appointed as a member of the scientific jury in the procedure for awarding the ONS "doctor" to Panagiotis-Christos Konstantinos Trihas, a full-time doctoral student in professional field 1.2. Pedagogy (Special Pedagogy) in English. At the first meeting of the scientific jury, held on 12.05.2023, on the basis of Art. 5, para. 12 of the Regulations on the terms and conditions for acquiring scientific degrees and occupying academic positions at Sofia University „St. Kliment Ohridski”, I have been designated as a reviewer.

The dissertation work was discussed at a meeting of the „Special Pedagogy” department, and all legal requirements for opening a public defense procedure were met.

Doctoral student Trihas has submitted all the documents in electronic and paper form necessary for the defense of his dissertation work, in accordance with the requirements of the ŽRASRB and the Regulations for its application and in accordance with the Regulations for the terms and conditions for acquiring scientific degrees and holding academic positions at Sofia University „St. Kliment Ohridski”.

### **General presentation of the PhD student**

In 2008, Panagiotis-Christos Trichas received a bachelor's degree in mathematics from the Aristotle University of Thessaloniki. Two years later, he received a license certificate in Special Pedagogy at the University of Macedonia in Thessaloniki. The training he received clearly motivated him to continue his education in this direction – in 2012 he graduated with a master's degree in special needs and inclusive education from the University

of Sunderland, England. He has completed two more master's degrees – in Organization and Management of Educational Institutions in 2019 (at the International Hellenic University of Thessaloniki) and in Adult Education in 2022 (at the Hellenic Open University, Patras, Greece).

He has extensive professional experience in the field of special education as a math teacher for students with special educational needs and a math teacher for adults. From 2013 to the present, he has been teaching in a number of schools in different cities in Greece to students with learning difficulties, ADHD, mental retardation, autism. Panagiotis-Christos Trichas has professional experience, not only in the field of teaching, but also in communication with parents and public services, in the development of projects to improve the social and communication skills of students. In recent years, the object of his interests has been innovative teaching methods.

Doctoral candidate Trihas's education and professional experience explain his interest in education issues, including the difficulties in teaching students with special educational needs and the need for support.

Has a computer skill – good command of the Microsoft Office package (Word, Excel, PowerPoint, Access). Experienced in using a web-based e-learning environment. Fluent in English (level C2) and German (level B1). Panagiotis-Christos Trichas proves his interest in teaching mathematics to students with special educational needs by continuing the last degree of higher education, as a full-time doctoral student in the doctoral program „Special Education” at Sofia University „St. Kliment Ohridski”. The choice of the topic of the dissertation development is relevant to his preparation and qualification in the bachelor's and master's degree.

### **Actuality of the issues of the dissertation work**

In recent years, a review of the policies in the educational space has become more and more categorically necessary due to the presence of students with special educational needs (a predominant part of which are those with intellectual disabilities) in general education schools. This is due to many circumstances, mostly related to the peculiarities of the mental development of these children. Therefore, they need support – cognitively, emotionally, to ensure their socialization.

Children with intellectual disabilities have potential opportunities for development, which, however, can only be realized with the help of specially organized training and upbringing under the influence of specific methods and means of work. Difficulties in the learning process are provoked by various factors, one of which is related to their low

cognitive activity. They have a number of peculiarities in the cognitive sphere that distinguish them from children with typical development of their age. Their thinking is incoherent, messy, non-targeted, stereotyped, and quite often quite minor and side irritants are able to distract their attention when performing a given task. This leads to making mistakes and difficult application of already acquired knowledge and skills in a new situation. Hence the difficulties in learning, especially in the so-called „intellectual” subjects (primarily in mathematics), which impose the need for a strictly individual approach to special education, with a wider use of visual aids and practical activity with subjects, as well as using a variety of methods to compare objects. Stereotyped thinking is typical of children with intellectual disabilities. They cannot transfer knowledge and skills to new situations. All mental operations are impaired – analysis is limited and fragmentary; the synthesis lacks systematicity; the comparison is incomplete and inaccurate (no more than two items can be compared); the summary is at a low level; abstraction is underdeveloped.

Based on researched scientific publications and his long-term practical experience as a mathematics teacher of students with various disabilities, PhD student Trihas is directed to research the specifics of teaching mathematics to students with mild mental retardation in high school. The topic is interesting because it deals with the organized learning process of older students, which requires the continuous application of more and more new and different methods and approaches to increase the effectiveness of learning. In this context, I evaluate the presented issues as dissertationable, with the necessary practical orientation and with a request for real contributions in the refinement of innovative educational approaches and technologies.

### **Structure and content of the dissertation**

The dissertation submitted for review contains 195 computer pages, including 56 tables, 22 graphs and 1 figure. A bibliography with a total of 49 sources in English is attached.

The dissertation is a theoretical-applied study with a well-realized design.

In *terms of content and quantity*, the work meets the requirements for a doctoral dissertation.

*Structurally*, the work consists of an introduction, five chapters, a conclusion and references.

*The introduction* clarifies the term 'mathematics education', noting that it refers both to the teaching and learning of mathematics (as a subject) and to the research aspect of mathematics as a specific field of knowledge. Even here, the importance of the topic stands

out in the foreground and the concept of the dissertation research is presupposed.

There is expediency regarding the presentation and analysis of the theoretical foundations of the research problem.

In the *first chapter*, „Mathematics Education”, a theoretical overview of various theories and approaches related to the teaching of mathematics is carried out. Three approaches that have influenced the study and teaching of mathematics are presented – behaviorism, constructivism and a sociocultural approach to learning. Emphasizes the characteristic of behaviorism as direct (direct learning) or „categorical” teaching with an emphasis on practice. Constructivism is presented as an active process of adaptation, through which knowledge is acquired through the already built perceptions, knowledge and experience and through the cognitive capacity of the student. Sociocultural approaches are explained through the prism of Vygotsky's theory of the child's cultural and social development and the two developmental zones. Separate paragraphs explain the „nature of mathematics” and the role of the teacher in mathematics education. The importance of various factors influencing the teacher's decision-making and teaching practices (beliefs, parents' expectations, national policies, professional identity, etc.) is highlighted.

In the *second chapter*, „Students with mental retardation – definitions and common features”, the development of the conceptual clarifications in recent years in ICD-10, DSM-V and ICD-11 is traced – mental retardation, intellectual disability, disorders of intellectual development. Doctoral student Trihas has chosen to operate in the dissertation development with the term „mental retardation” and specifically – mild mental retardation. The characteristics of students with mental retardation related to the learning process are very precisely presented, highlighting the specifics in perceiving a specific situation, in understanding and memorizing and reproducing cognitive information, in the use of speech, etc. In this connection, the law 2817/2000 on special education in Greece and the possibilities of teaching students with mild mental retardation in general education and special schools and inclusion classes is also cited. The educational intervention and the intervention are described, indicating the areas on which the education of these students is focused.

Given the topic of the dissertation work, a special paragraph is set aside that presents the characteristics of students with mental retardation in the period of high school education. The need for cooperation between class teachers and special teachers in order to create a specialized pedagogical program with specific goals and tasks for each student is thoroughly and competently brought out.

The *third theoretical chapter* offers an analysis of the key elements related to the educational process of students with mental retardation: capacity and deficits (described by the doctoral student as „strengths” and „weaknesses”); assessment of learning to design educational programs for these students.

Attention is also directed to the content of educational programs. Doctoral student Trihas makes the clarification that the dissertation is not intended to support integrated education or training in the special school. His attention is directed to the organization of the space and to the teaching materials, highlighting the need for both interdisciplinary cooperation (the cooperation of scientists from different specialties in order to improve the education of students with disabilities) and cooperation between the school and the family – questions discussed in separate short paragraphs.

In the last *fourth theoretical chapter*, teaching mathematics to students with mental retardation is clarified from the point of view of the role of the teacher in this process, the mathematical skills that must be mastered and the role of the individual educational program for achieving high academic results.

The research methodology is presented in *the fifth chapter*. It adequately defines the purpose of the research and the research questions.

The goal set by doctoral student Trihas is aimed at researching the techniques of teaching mathematics to students with mild mental retardation in high school. It is decomposed into two research questions concerning the level of mathematics teaching.

Data collection tools are correctly selected and described.

100 teachers teaching at the high school stage of education of students with mild mental retardation take part in the research.

A questionnaire consisting of a total of 21 Likert-type questions was used for data collection. The questions are selected in order to obtain and analyze information about the didactic materials used, the objectives of the mathematics lessons, cognitive maps, summaries at the end of the lesson, learning strategies, active participation of students, etc.

Data collection was done through a Google form on social networks due to the Covid-19 pandemic. Teachers' participation is voluntary and anonymous.

The processing of the obtained results is carried out using the statistical package SPSS v.25. Descriptive statistics use percentages, frequencies, means, and standard deviations to analyze all questionnaire variables. The Chi-Square test (Chi-Square test  $\chi^2$ ) was used and a crossover analysis was performed. Primary empirical data are presented and analyzed through appropriate tables and graphs created in SPSS or Microsoft Excel.

The specificity of the dissertation determines the logic according to which the presentation of the research results follows. Values from 1 to 5 (1 – never, 2 – rarely, 3 – sometimes, 4 – often, 5 – always) were used to answer each question.

The higher the mean value, the more participants use each learning method. The findings from the answers to all 21 questions according to the set criteria are presented sequentially. It was found that between „often” and „always” respondents answered questions about the purpose of the lesson, emphasis on practical learning, teaching learning strategies, summaries of the main points at the end of the lesson, etc.

The PhD student also presents inductive statistics on the two main research questions. To answer the research questions, a Chi-square test (Chi-square  $\chi^2$ ) was used to reveal significant relationships between variables.

On the basis of the obtained results, findings regarding the research questions are drawn.

The conclusion is a meaningful summary of the findings presented by the doctoral student and a serious basis for recommendations regarding the preparation and work of teachers with students with mild mental retardation.

### **Dissertation Contributions**

The treatment of the main theoretical propositions in relation to the topic of the dissertation development, as well as the obtained research results, require the formulation of scientific, theoretical and practical-applied contributions. These are not directly stated either in the dissertation or in the abstract.

### **Abstract and publications**

The abstract is developed on 59 pages (not including the literature at the end). Corresponds to the structure of the dissertation development by presenting it in an appropriate way, reflecting the main theoretical positions and the results of the conducted research.

There are 5 publications accompanying the dissertation development – four independent and one co-authored with the supervisor. They were published in the Collection „Education and Arts: Traditions and Perspectives” of the National Institute of Education and Research, UI „St. Kl. Ohridski”, in the collection „Young researchers” of Sofia University „St. Kl. Ohridski” and in the European Journal of Education Studies in the period 2019 – 2022. All of them are on the topic of the dissertation work, deal with challenges in the process of learning mathematics, teaching strategies and theoretical approaches to teaching mathematics to students with intellectual disabilities.

### **Notes, recommendations and questions:**

✓ I believe that the theoretical chapters should (in my opinion) have a different sequence. To introduce students with intellectual disabilities at the beginning, then to specify their education to reach mathematics education and mathematics as a subject.

✓ Some of the paragraphs and subsections are very short and give the impression of fragmentation (eg 2.1.1; 2.6, 2.7, 2.8.; 3.3., 3.1.2.2., 3.1.2.3.; 4.2., 4.3., etc.) . They should engage in more general problem areas.

✓ The analytical part of the dissertation development would be better understood if the teacher questions from the Google form appeared as attachments.

*I recommend* that PhD student Trihas, in subsequent publications, try to analyze the empirical data in more detail, which will allow drawing a number of conclusions and recommendations for practice.

*My questions* are:

✓ How would you define the subject and object of your research?

✓ What contributions would you derive from the theoretical presentation of the problem laid out in the dissertation and from the research conducted?

✓ Based on the results obtained from the answers of the respondents, what conclusions would you draw regarding the preparation of teachers in Greece to work with students with intellectual disabilities?

### **CONCLUSION**

The dissertation work submitted for review, developed by doctoral student Trihas, is in accordance with the requirements for writing a similar type of scientific work. On the basis of the scientifically interesting idea proposed in the dissertation development and the demonstrated qualities for independent scientific research, I give my positive assessment and propose to the honorable scientific jury to award the educational and scientific degree „doctor” to Panagiotis-Christos Konstantinos Trichas in the field of higher education: 1. Pedagogical sciences, professional field 1.2. Pedagogy, Doctoral program „Special Education”.

17.06.2023

Shumen

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