REVIEW

by Dr. Maria Petrova Temnikova, associate professor at the Faculty of Pedagogy,

Thrakia University - Stara Zagora

of the materials submitted for participation in the competition

to occupy the academic position of "associate professor"

on "Methodology of education in mathematics for children in preschool age"

at the Faculty of Pedagogy, Thrakia University - Stara Zagora

in the field of higher education 1. Pedagogical sciences

professional area 1.3. Pedagogy of education in ...

Contest details

Chief Assistant Yordanka Dencheva Ilieva, Ph.D., is the only candidate in the competition for the position of Associate Professor, announced in the State Gazette, No. 88 of 20.10.2023 by the Thracian University. The papers presented by her in the procedure are original author`s works.

Information for the candidate

There is only one candidate in the competition. This is Yordanka Dencheva Ilieva, PhD. Mrs. Ilieva was born on January 5th, 1971 in the town of Shoumen. In 1993, she graduated from the Highest Institute of Pedagogy "Konstantin Preslavski" with a specialty in Preschool Pedagogy. At the Shumen University of "Bishop Konstantin Preslavski", DIPKU - Varna, she acquired the third, second, and first professional qualification degrees, respectively. In 2014, she was enrolled in full-time study in the doctoral program "Methodology of Education in Mathematics and Informatics (in Kindergarten)" at the Department of "Methodology of Education in Mathematics and Informatics".

The work experience of Dr. Yordanka Dencheva Ilieva is in the field of kindergarten education as follows: teacher and senior teacher, senior expert in preschool education at the Regional Inspectorate of Education, part-time assistant in "Methodology of the development of basic mathematical knowledge in kindergarten" at the Shoumen University "Bishop Konstantin Preslavski". On March 1, 2022, Yordanka Dencheva Ilieva, Ph.D. started work on the position of Chief Assistant in Methodology of Education in Mathematics for Preschool at the Faculty of Pedagogy of the Thracian University, Stara Zagora.

Description of candidate`s scientific works

The candidate participates in the procedure with two monographic papers, one of which is based on her dissertation for awarding the educational and scientific degree Ph.D.; one article in a journal that is referenced and indexed in world-renowned databases; eleven articles in non-referenced peer-reviewed journals and edited collective volumes. The scientific materials presented in the competition procedure do not repeat the works presented in the previous procedure for acquiring the educational and scientific degree Ph.D.

Scientific contribution

The overall publication activity of Chief Assistant Yordanka Dencheva Ilieva, Ph.D., is devoted to the area of pedagogical.

Two monographs are presented for assessment in the competition: The habilitation thesis "STEAM workshop "Mathematical Kaleidoscope" in kindergarten" and "Innovative didactic-technological model to measure the categories “I know - I can learn everything myself". 12 separate articles in Bulgarian are submitted for review as well.

The habilitation study is the main work related to the procedure. The monograph consists of a preface, four chapters, and a conclusion.

The candidate presents in the Preface the motivation for considering STEM education in preschool age.

The first chapter is titled "Theoretical Foundations and Analysis of the Problem". The essence of STEM education and the characteristics of the STEAM approach, which integrates constructive, research, and interdisciplinary technologies entering education, are examined. In the adaptive framework of STEAM in preschool, the author describes the participation of the four C skills: creativity, collaboration, critical thinking, and communication.

The contribution of the research work is the examination of modern approaches and educational technologies in kindergarten, with an emphasis on the competence approach.

The candidate emphasized to the importance of the productive educational technologies and activities in kindergarten and defined them as productive activities of children - construction and visualization activities (drawing, modeling, appliqué, plasticine, testoplastics, etc.), carried out under the supervision and guidance of a teacher.

In Chapter Two, the author presented the approbation of the newly developed STEAM studio model "Mathematical Kaleidoscope". The general structure of the conceptual model is described

and the goal, object, subject, theoretical-research and practical-applied tasks, hypothesis, criteria, and indicators in the methodological components of the model-building concept are defined.

The contribution of the research work refers to the newly developed model of the STEAM workshop "Mathematical Kaleidoscope", which includes five modules: Constructive mathematics, Artmathematics, Green mathematics, Mobile mathematics, and Technomathematics.

In Chapter 3, Dr. Y. Ilieva examined the application of the STEAM workshop "Mathematical Kaleidoscope" in the pedagogical interaction in mathematics.

Contributions that stand out in the research work are the games developed by the author and the 7 author's scenarios of pedagogical situations with the application of the STEAM approach.

In Chapter 4 the author presented analyses of the results of the experimental work. Variance Analysis was used with the application of statistical data processing software SDPS, through which the statistical analysis of the quantitative data was carried out. Student's T-test (T) was adopted to test the proposed hypothesis.

The habilitation thesis would benefit from a better differentiation of the concepts of mathematical terminology and understanding, competency, and competences as well as demonstrating in full the content of each one of them including the degree of their presence in the experimental work. Analysis of the formal state requirement regarding the integration between the educational clusters in the various areas of preschool education would be beneficial for this research work, too.

Presenting only quantitative data makes difficult the transition to the quality of the responses and the three-grade scale. It is necessary to describe the characteristics of each of the three points to determine the assessment range of "do not cope", "cope with help" and "do cope" grades. The conclusion in the hypothesis is voluminous and difficult to measure.

The second monograph of Dr. Y. Ilieva "Innovative didactical-technological model to measure the categories I know - I can learn everything myself" is based on her defended dissertation for awarding the educational and scientific degree "Ph.D".

The theoretical foundations of the problem are discussed in Chapter 1. In the first subsection, the candidate examines the content of the idea of "quantity" based on classic and modern theoretical concepts related to "quantity" and "measurement" in mathematics. Brief but essential historical facts about the phylogeny of the concept of quantity and measurement of quantities are presented. In the second subsection, the author examines the psychological aspects regarding the quantities and their measurement. In the third subsection, the author presents modern theories and approaches

for the development of mathematical competencies in children of preschool age through measurement.

In Chapter 2, Dr. Y. Ilieva offers the author's model "I know to measure - I can learn everything myself!" for the development of ideas about quantities and their measurement in 5-7-year-old children. The model helps to achieve the main goals of the educational Cluster "Measurement". The object, subject, hypothesis, purpose, and tasks of the research are described. The criteria and indicators of the research work are presented as well as the general structure of the conceptual model.

Based on her rich pedagogical experience and the technological circle presented by Z. A. Mihailova and the team, the candidate has developed a technological model "Variability of quantities". Dr. Y. Ilieva described the studio as an alternative, innovative, and interactive organizational form of pedagogical interaction.

A major contribution of the research work is the development and description of the content of 42 games. Dr. J. Ilieva purposefully classifies and summarizes the types of games for comparing and measuring quantities. The first group of games includes the ones for comparing and measuring quantities. To this group the author added didactic games for comparing and measuring: the quantities "length", "mass", "area", "time", "value", bulk volume substances, and liquids and, speed measurement.

The second group includes autodidactic games, autodidactic dice, and lotto-type games. The third one includes mobile games, the fourth - games with natural materials, and the fifth - games with interactive toys (Bee-Boot).

Chapter 3 presented an analysis of the results obtained from two tests for incoming and outgoing diagnostics. The quantitative results, processed with the help of specialized software for statistical data processing (SPSS), gave grounds to Dr. Y. Ilieva to acknowledge the working hypothesis as reliable. The obtained results of the experimental work are illustrated with tables and diagrams.

As a result of her work, the researcher formulated 15 conclusions. For the theory and practice in preschool education, conclusions 1. and 2. are known.

At a theoretical level, the contribution of Dr. Y. Ilieva is the in-depth and multifaceted theoretical study related to the mastering of elementary mathematical concepts of quantity and measurement in preschool age, the disclosure of the specifics of the use of different types of games, and the

developed technological didactic model for forming of mathematical competence in 5-7-year-old children when measuring.

At a practical level, the candidate's contributions can be related to the developed 42 didactic, self-didactic, mobile, and constructive games for the development of the ideas about quantities and their measurement, description of the options for using the studio as an alternative organizational form in mastering ideas about quantities and their measurement at 5-7-year-old children.

The study could be deepened and refined by including the quantity "time" in addition to the development of the ideas about the quantity "length", "mass", and "volume".

Regulation No. 5 related to preschool education, contains the educational cluster "Time relations" including the concept of time which, however, is difficult for the children to understand and learn. Some of the games described by the candidate are related to concepts for which mathematical understanding is not developed in Groups 1-4 of kindergarten so these games need reconsidering. Such concepts are the concept of "area" ("face of a plane figure") as it is studied in Grade 4 of Primary school; the concept of "speed", which is a derivative of distance and time, to measure speed, which is studied in Grade 5; the quality "age" and ordered by age.

Not only the results of Student's t-test of the children from the experimental group and the control group according to the three criteria could be presented in a tabular version, but also the initial data of the results achieved by the children, according to the three-point scale for each one of the tasks included in the diagnostic tests. In Table No. 5 for Criterion 2., for indicators 2.2. and 2.3. For Indicator 2, it is necessary to correctly use the term "mass" instead of the term "weight".

The author's research Dr. J. Ilieva on the application of the STEM approach in preschool education is also presented in the article "Innovative form - STEAM - workshop for 5 - 7-year-old children". The STEAM workshop "Funny Math" as an innovative organizational form of learning is examined. Two projects of pedagogical situations were developed. The importance of interdisciplinary education and the application of constructive, active, and research learning methods for the development of the foundations of children's mathematical competence is outlined.

Two of Dr. Y. Ilieva's articles are related to the development of children's understanding of quantities and their measurement: "Quantities and measurement in Waldorf kindergartens and schools" and "Practical aspects of studying quantities in the educational area "Mathematics" in the kindergarten".

In the first article, the researcher examined basic concepts on which Waldorf pedagogy is based and described various activities related to the quantities and their measurement, which are implemented in Waldorf kindergartens. In the second article, the author presented a study aimed at evaluating the teachers` opinions regarding problems related to the mastery of knowledge and the development of skills in children from the educational Cluster "Measurement". Results of a survey among practicing teachers in kindergartens are graphically presented and analyzed.

A contribution to the research work of Dr. J. Ilieva is the examination of the application of productive educational technologies. In the article "The Role of Productive Educational Technologies for Development of Mathematical Competence in 5-7-year-old Children" the essence and characteristics of productive technologies are described including the productive activities in preschool education and the research-creative activity of children.

A key article reflecting the scientific development of Dr. Y. Ilieva is "Mathematical Theater" for 5-7-year-old children". According to the author, this innovative form and theatrical mathematical games integrate and transfer concepts from a large number of educational areas in kindergarten and can be successfully applied as a fragment in pedagogical situations in mathematics.

Mastering mathematical knowledge in nature is a study that Dr. Y. Ilieva presents in her article "Development of mathematical competencies in 5-7-year-old children through activities in nature". In this article, the author considers nature as a rich cognitive environment for the development and consolidation of mathematical concepts - number, shape, arrangement, etc. In this research work, it is desirable to highlight more categorically the methodology of work for the development of mathematical understanding in children through the integration of mathematical knowledge with knowledge of nature.

The author in her article "Integrating Mathematical Knowledge with Other Activities "Explored ideas for applying the integrative approach in preschool education is also described by. The goal is to establish what are the possibilities for developing logical thinking in 6-7-year-old children by integrating mathematical knowledge with other activities. The researcher presents the developed game-cognitive situations, built on an integrative basis.

It is necessary to present in this article the results of the experimental work in connection with the second task of the research work namely the tracking of the changes in the development of logical and abstract thinking in the children because they participated in the described situations. The

conclusion that all children from the experimental group have a higher level of mental development is also incorrect.

In her article "Modelling as a Method and Tool in the Process of Pedagogical Interaction in Mathematics in Kindergarten", Dr. Y. Ilieva considers modeling as a leading, visual-practical method of mathematical learning, which is widely used in kindergarten.

Dr. J. Ilieva's research interests are also focused on analyzing the education in mathematics of children in the Scandinavian countries. The results of this aspect of her research work are presented in the article "Mathematics Learning of pre-school Children in Denmark". The author's contribution is related to the examination of the preschool educational program.

One of the areas of competence related to learning in the preparatory kindergarten class is Mathematical Development. There are four areas of knowledge, skills, and relations described - 'Numbers', 'Quantity', 'Figures and patterns', and 'Language and thinking'.

In the article "Didactic Games for safe traffic, disasters and Accidents", Dr. Y. Ilieva shares her pedagogical experience regarding the application of didactic games for safe traffic. This is helpful, as a system with such content has never been included in the educational work through games with children in kindergarten. Of the 4 games described, only one has elements of mathematical content related to strengthening children's knowledge of numbers up to 10.

The articles "European Fairy Tales in the Productive Activity of Children" and "Protecting the Health and Life of Children in Risky Situations" show the multifaceted interests of Dr. Y. Ilieva, however, they have no relation to the methodology of teaching mathematics in preschool education.

The candidate's citations presented for the procedure are 11 in total. Two of them are published in scientific journals, referenced and indexed in world-renowned databases, one is in a monograph, four are in peer-reviewed collective volumes and four citations are in non-refereed journals with scientific reviewing. This shows that the studies of Ch. Assistant Dr. Y. Ilieva is important to the scientific community.

Teaching experience

Chief Assistant Professor Y. Ilieva covers a wide range of courses, including Pedagogy of Mastering Elementary Mathematical Concepts in Kindergarten, Methodology of Teaching Mathematics in Grades 1-4., Qualitative Characteristics of Mathematical Education in Kindergarten, and Grades 1-4. Additionally, she has experience of teaching various specialties

such as Preschool Pedagogy, Preschool and Primary School Pedagogy, Primary Pedagogy with a Foreign Language, and university bachelor's and master's degree courses.

Questions to the participant in the competition for the position of Assistant Professor

To Monography 1.

What is your understanding of the term "ability" and how it affects the process of development of competencies in children?

How the science component of the STEAM approach for all scenarios and games has been integrated into the work methodology? How are the interdisciplinary connections created and realized?

There are no observational data and no observational protocols in the Appendixes of the monograph. The diagnostic test for Criterion 2. is the only one that is not sufficient to measure the degree of the 4K skills development. Which of the suggested tasks and games from this test are for the inbound and which ones are for the outbound diagnostics regarding Criterion 2.?

In the test related to Criterion 2, tasks of the type such as 1.3. exceed the requirements for educational content laid down in Regulation No. 5. When was the idea of constructing a mathematical model brought up as part of the research concept?

What is the work methodology when using the interactive whiteboard and the programmable Bee-Boot toy in the Technomathematics module in the STEAM workshop? How do the kids plan the next move and how do they program the Bee-Boot bee?

To Monography 2.

Which elements of the key competencies identified in the hypothesis and the children's competencies have been developed through the research work?

The triangle as a unit for measurement of an area is incorrect propaedeutics. What is the methodology of work for "awareness of the inversely proportional relationship between the face of a geometric figure (rectangle) and the unit of measurement"? How the concept of "area" and the unit of its measurement has been clarified to the children?

What is your understanding of the quantity of age?

Conclusion

The contributions of Chief Assistant Yordanka Ilieva, her scientific and teaching activity, research pursuits, and the relevance of the publications submitted for review convincingly prove her

professional competence as a university teacher and researcher, who affirms her authorial presence with theoretical and applied scientific contributions.

Herewith, I give my positive assessment and recommend to the respected Scientific Jury to elect Chief Assistant Yordanka Dencheva Ilieva, Ph.D., to the academic position of Assistant Professor at the Faculty of Education of the Thrace University-Stara Zagora in the field of higher education 1. Pedagogical sciences, professional area 1.3. Pedagogy of education in ...

February 26th, 2024 Assistant Professor Maria Temnikova, Ph.D