Pedagogical Differentiation in Primary Education: Conceptual Determinants and Definitions

Eurydice-Maria Kanellopoulou[1] & Maria Darra[1]

[1] Department of Primary Education, University of the Aegean, Rhodes, Greece

Correspondence: Eurydice-Maria Kanellopoulou, Department of Primary Education, University of the Aegean, Dimokratias 1, 85132, Rhodes, Greece. E-mail: evikanell@gmail.com

Abstract

The purpose of this paper is, through content analysis of 30 publications in the Greek and international literature in scientific texts, books, journal articles and conferences to analyze the conceptual content of pedagogical differentiation in primary education as it emerges from the descriptions and discussion of authors, researchers and experts. From the analysis, twelve dimensions or characteristics of pedagogical differentiation emerged that presented the highest frequency of occurrence in four broad categories. These are: a. "processes", b. "context", c. the "learning outcomes" and d. "assessment". The results of the research show that in primary education the dimension with the highest frequency is the modification of the supportive learning context, followed by the order of frequency of meeting the needs of the students and student-centered teaching and learning. Furthermore, the dimensions with the lowest frequency of occurrence include the possibility of learning option/multiple options, the development of procedural knowledge skills, and finally, the lowest is the continuous assessment.

Keywords: pedagogical differentiation, dimensions of pedagogical differentiation, primary education

1. Introduction

The modern social reality, which is characterized by rapid technological, economic and cultural developments, creates needs to which the education system is called to respond. Globalization, immigration and the economic crisis have shaped multicultural societies in which social inequalities widen and student diversity in classrooms increases (Manolakos, 2012). Classes in Greece and internationally show strong heterogeneity, due to the differences of students in knowledge, skills and abilities, the integration of which in classes of the educational system takes place with the sole criterion of age (Kanakis, 2007). Learning differences can lead to the marginalization of less able students, intensify feelings of frustration and exclusion from the educational process, their removal from which can lead to school failure.

A didactic approach, which can effectively solve the different educational requirements of students and is the subject of study by many researchers, is pedagogical differentiation (Valiandes & Neophytou, 2017). Researchers' views on the precise definition and adoption of a commonly accepted definition of pedagogical differentiation in primary education are not completely identical. In their studies, various definitions of pedagogical differentiation are recorded, which describe its individual characteristics or dimensions, reflecting their different approaches.

Indicatively, Tomlinson (2000, pp. 6-7) considers that pedagogical differentiation is "maximizing the learning potential of each student". According to Heacox (2014, p. 5) pedagogical differentiation is recorded as "the change of pace, level or type of teaching provided in response to the needs, learning styles or interests of individual students". Pedagogical differentiation by Wormeli (2005, p. 3) is considered as "a collection of best practices used strategically to maximize student learning". Furthermore, Tomlinson (2014, p. 5) notes that pedagogical differentiation is "the approach with which teachers work daily to find ways to approach individual students with different starting points in readiness, interest and preferred approaches to learning." Wenzel (2017, p. 47) states that pedagogical differentiation is "an educational approach to tackling increased diversity in the classroom." De Jesus (2012, p. 6) characterizes pedagogical differentiation as "the practice of modifying and adapting students' materials, content, learning plans and "products" and assessment to meet their learning needs". Gregory & Chapman (2013, p. 373) define pedagogical differentiation as "a system of values and perceptions adopted by teachers to meet the unique needs of each student and not as a set of tools."

The purpose of this paper is to analyze the conceptual content of the term pedagogical differentiation in primary education, through the study of material from scientific texts, books and articles in scientific journals and conferences in order to determine the characteristics or otherwise the elements that constitute the term pedagogical differentiation in that level of education. Initially, a conceptual map of the definition was designed and at the conclusion, a table of twelve dimensions of pedagogical differentiation related to the processes, the context, the learning outcomes and the assessment was produced.

2. Methodology

For this study a literature review was conducted in order to develop a list of those important components that various researchers, experts and authors use to define the concept of pedagogical differentiation in primary education. The method used was similar to that used by others researchers to determine quality assessment guidelines in the absence of empirical studies (Frey, Schmitt, & Allen, 2012; Frey, Petersen, Edwards, Pedrotti, & Peyton, 2005; Frey & Schmidt, 2006). The prevailing view of experts, theorists, researchers and educators was used in an attempt to identify the basic components of pedagogical differentiation. Pedagogical differentiation was examined in specific subjects of primary education as language arts, science, mathematics, English as a foreign language (McLean, 2010; Tobin & Tippett 2014; Cannon, 2017; Xanthou, 2015).

For primary education, 30 publications have been found, in journals articles, conferences, books and various scientific papers, in which various authors have defined pedagogical differentiation by giving various characteristics of it or by providing an unchanged definition of the process of pedagogical differentiation through which these characteristics emerge.

The aim was, through content analysis, to examine the concept of pedagogical differentiation in primary education through the descriptions and discussion of authors, researchers and experts.

3. Process of Identification of Dimensions of Pedagogical Differentiation

The identification of dimensions of pedagogical differentiation is subject to the subjective judgment of the researchers. Below there are some examples regarding the identification of some of these dimensions as they emerged from the original texts of the publications that were collected and examined.

"… Variety of approaches to how students learn…" (McLean, 2010: 51).

"… adaptation of teaching by the teacher using alternative teaching practices" (Fykaris & Mitsi, 2012, p. 919).

"… to teach each student in a way that ensures individual learning is taking place …" (Rodriguez, 2012, p. 19).

The above were classified in the Modification of supportive learning context dimension.

Below are some examples of phrases related to the definition of pedagogical differentiation which were classified in the dimension Meeting the needs of students.

" … an effective teaching tool to meet the diverse academic needs of learners" (Burkett, 2013, p. 3).

" a teaching model that has been widely accepted in many school systems to address the instructional needs of diverse learners … that allow differences in students' learning styles, interests, prior knowledge … " (McLean, 2010, pp. 2,7).

The following examples are given below for the Continuous improvement of learning for all students dimension.

"…. a form of individualized pedagogy that aims to deal with school failure" (Sfyroera, 2004, p. 24).

" … to help students progress to more advanced levels of functioning and a better match of learning opportunities" (Reis, McCoach, Little, Muller, & Kaniskan, 2011, p. 466).

For the dimension of Student-centered teaching and learning, the following two examples are given.

"… instruction responsive to all learners in a classroom …" (Hockett, 2010, p. 7).

" Differentiated instruction places students at the center of learning…" (Whipple, 2012, p. 12).

Subsequently, for the dimension Flexible learning context/flexible grouping, the following examples are provided.

" …teachers assume a flexible approach to teaching…" (Burkett, 2013, p. 4).

"… a proactive, qualitative and flexible process for students…" (Xanthou, 2015 p. 22).

For the Possibility of learning option/multiple options dimension the following two examples are given.

"… a variety of approaches to what students learn…" (McLean, 2010, p. 51)

"… the multiple choices, so that all students master the didactic content" (Pranziou, 2015, p. 16).

In addition, for the dimension Success and active participation of the student in his learning, the following three examples are presented.

"… Teacher-student relationships impact student achievement and involvement …" (Flaherty & Hackler, 2010, p. 25).

"… providing students with multiple, flexible means of representation, expression, and options for engagement" (Tobin & Tippett, 2014, p. 424).

"… contribute to increase the students' motivation …" (Solberg, 2017, p. 14).

Moreover, for the dimension Development of life skills the following example is provided.

"… it engages students and allows them to take greater responsibility and ownership of their learning, while providing opportunities for peer teaching and cooperative learning" (McLean, 2010, p. 51).

Below, two examples for the dimension Development of procedural knowledge skills are presented.

"Pedagogy that is focused on the learning processes themselves, ie the ways in which different people learn and not on the learning outcomes" (Sfyroera, 2004, p. 23).

"… the instructional process of ensuring that what a student learns …" (Boges, 2015, p. 3).

The following three examples are given for the Modification of learning "products" dimension.

"… by focusing on the process by which students learn, the products or demonstrations of their learning …" (Watts-Taffe et al., 2012, p. 304).

… The approach encompasses modifying the … "product" (Burkett, 2013, p. 4).

"… the expression by all students of their knowledge" (Pranziou, 2015, p. 16).

Furthermore, for the Alternative/modern forms of assessment dimension, the following examples are given.

"… it allows for teachers to give more positive feedback so students see what they do well" (Flaherty & Hackler, 2010, pp. 24-25).

"… an instructional method that allows teachers to develop a detailed understanding of each student's readiness, interests, and modes of learning through a range of instructional and management strategies " (Rodriguez, 2012, p. 5).

Finally, for the Continuous assessment dimension, the following two examples are presented.

"… Continuous assessment provides information about students' progress…" (Karageorgou, 2013, p. 187).

"…. pedagogical differentiation involves continuous assessment …"(Puzio, 2012, p. 6).

In the early stages of the literature review, a conceptual map was created in which the key elements of pedagogical differentiation from each publication were noted. This helped to create labels for the number of items that were found. Common or similar elements of the definitions were entered in the same column, and as the study of the material was in progress and other elements emerged, the original categories were revised to include these new elements. This means that many similar elements have been combined in order to have a category, as the goal was to create as few categories as possible. In the end, twelve dimensions of pedagogical differentiation emerged and for each dimension it was presented the frequency of popularity, specifically calculating the relative frequency, in order to underline the significance of each element.

Figure 1 presents the conceptual map that shows the initial pilot identification of elements of pedagogical differentiation in primary education, related to processes, context, learning outcomes and assessment.
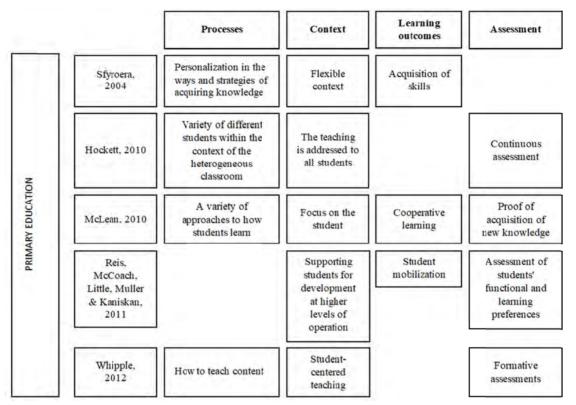
		Processes	Context	Learning outcomes	Assessment
PRIMARY EDUCATION	Sfyroera, 2004	Personalization in the ways and strategies of acquiring knowledge	Flexible context	Acquisition of skills	
	Hockett, 2010	Variety of different students within the context of the heterogeneous classroom	The teaching is addressed to all students		Continuous assessment
	McLean, 2010	A variety of approaches to how students learn	Focus on the student	Cooperative learning	Proof of acquisition of new knowledge
	Reis, McCoach, Little, Muller & Kaniskan, 2011		Supporting students for development at higher levels of operation	Student mobilization	Assessment of students' functional and learning preferences
	Whipple, 2012	How to teach content	Student-centered teaching		Formative assessments

Figure 1. Initial pilot identification of elements of pedagogical differentiation

4. Results

The 12 dimensions of pedagogical differentiation that were most reported in the publications were grouped into the following four categories:

a) Processes

- Modification of the supportive learning context

- Meeting the needs of the students

- Continuous improvement of the learning for all students

b) Context

- Student-centered teaching and learning

- Flexible learning context/flexible grouping

- Possibility of learning option/multiple options

c) Learning outcomes

- Success and active participation of the student in his learning

- Development of life skills

- Development of procedural knowledge skills

d) Assessment

- Modification of learning "products"

- Alternative/modern forms of assessment
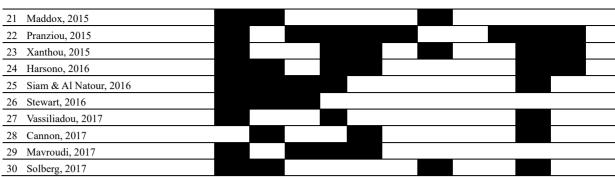
- Continuous assessment

Definitions have been collected in primary education, as well as data on pedagogical differentiation from 30 publications. Analytically, the dimension with the highest frequency is the modification of the supportive learning context (86.6%) which falls into the broader category "processes". They are followed by meeting the needs of the students (53.3%) which belongs to the category "processes" as well as the student-centered teaching and learning

(50%) which belongs to the category "context". Then the modification of learning "products" (43.3%) belonging to the category "assessment" and the flexible learning context/flexible grouping (43.3%) belonging to the category "context" are followed by the same percentage and follow with the same frequency of occurrence, the alternative/modern forms of assessment (33.3%) which belongs to the category "assessment" and the continuous improvement of learning for all students (33.3%) which belongs to the category "processes". A slightly lower percentage of occurrence is the dimension of success and active participation of the student in his learning (26.6%), and an even smaller percentage is the development of life skills (16.6%) which belong to the category "learning outcomes". With an even smaller percentage is noted the dimension of possibility of learning option/multiple options (13.3%) which falls into the category "context", the development of procedural knowledge (10%) which belongs to the category "learning outcomes", and finally the lowest frequency the continuous assessment (6.6%) which falls into the category "assessment". Then each dimension is analyzed separately and the data included in each are presented.

Tables 1 contains the publications that were studied pedagogical differentiation in primary education. For any scientific text, article or book in which a dimension of pedagogical differentiation was part of the definition, as it was presented in the publication, the cell associated with that dimension was shaded. Furthermore, the following table records the percentages that show the frequency of occurrence of each dimension of pedagogical differentiation.

Table 1. The dimensions of pedagogical differentiation in primary education

Categories		Processes			Context			Learning outcomes			Assessment		
s/n	Dimensions of pedagogical differentiation	Modification of the supportive learning context	Meeting the needs of the students	Continuous improvement of the learning for all the students	Student-centered teaching and learning	Flexible learning context/flexible grouping	Possibility of learning option/multiple options	Success and active participation of the student in his learning	Development of life skills	Development of procedural knowledge skills	Modification of learning "products"	Alternative/modern forms of assessment	Continuous assessment
	Percentage of occurrence of each dimension	86.6%	53.3%	33.3%	50%	43.3%	13.3%	26.6%	16.6%	10%	43.3%	33.3%	6.6%
1	Sfyroera, 2004	■		■	■			■					
2	Koeze, 2007	■									■		
3	Bantis, 2008	■			■								
4	Kimberly et al., 2009	■						■					
5	Flaherty & Hackler, 2010	■		■	■			■				■	
6	Hockett, 2010	■		■	■							■	
7	McLean, 2010	■		■				■	■				
8	Reis et al., 2011			■	■			■					
9	Fykaris & Mitsi, 2012	■	■		■								
10	Puzio, 2012	■											■
11	Rodriguez, 2012	■	■									■	
12	Scott, 2012	■		■							■		
13	Watts-Taffe, et al., 2012	■		■	■			■		■	■		
14	Whipple, 2012	■			■			■					
15	Burkett, 2013	■		■	■								
16	Karageorgou, 2013	■		■									■
17	Fykaris, 2013			■	■								
18	Tobin & Tippett, 2014	■	■		■			■					
19	Valiandes, 2015	■	■	■				■					
20	Boges, 2015		■							■	■		

21	Maddox, 2015
22	Pranziou, 2015
23	Xanthou, 2015
24	Harsono, 2016
25	Siam & Al Natour, 2016
26	Stewart, 2016
27	Vassiliadou, 2017
28	Cannon, 2017
29	Mavroudi, 2017
30	Solberg, 2017

* The shaded areas indicate the presence of each element

5. Discussion

Dimensions of pedagogical differentiation in primary education

The dimension of the modification of the supportive learning context is the most basic feature of pedagogical differentiation, as many researchers find in their definitions that it allows teachers to adapt their teaching to different learning styles, interests and students' prior knowledge (McLean, 2010; Solberg, 2017), modifying resources (Scott, 2012) and making changes and adjustments to a regular class (Solberg, 2017). They also point out that by modifying the learning environment according to students' abilities and their previous knowledge, their motivations and different ways of learning (Burkett, 2013; Solberg, 2017) a supportive teaching environment is created by teachers, where each student feels valued (Flaherty & Hackler, 2010). In addition, by adjusting the difficulty, amount of work and speed of teaching (Solberg, 2017) and the use of alternative teaching practices, methods and strategies by the teacher (Fykaris & Mitsi, 2012; Scott, 2012), who takes into account the learning preferences within the zone of impending development of students (Maddox, 2015), different options of access to information are provided to students (Siam & Al Natour, 2016) and equality in their learning opportunities is achieved (Valiandes, 2015).

On the other hand, the dimension of meeting the needs of students, although identified with a much lower frequency than the previous dimension, seems to be an equally important feature of the definitions, as in many studies pedagogical differentiation is defined as a process aimed at meeting the diverse and different individual needs of students within a heterogeneous classroom (Kimberly, Grimes & Stevens, 2009; Solberg, 2017). This dimension also includes, according to some researchers, the contribution of pedagogical differentiation in overcoming inequalities and in promoting social justice (Valiandes, 2015) focusing on equal opportunities in learning for all students (Pranziou, 2015), with respect of teachers for their diversity in terms of gender, culture, learning preferences, skills, competence levels and socioeconomic background (Xanthou, 2015).

In terms of the dimension of student-centered teaching and learning, this is another important feature of pedagogical differentiation, as many researchers refer to their definitions as a strategy that puts students' learning needs at the heart of teaching (McLean, 2010; Whipple, 2012; Karageorgou, 2013; Boges, 2015; Harsono, 2016), contributing to the achievement of their learning goals (Rodriguez, 2012). They also consider it as an innovative way of thinking about teaching and learning (Siam & Al Natour, 2016), a anthropocentric and anthropoplastic pedagogical proposal (Valiandes, 2015), which is based on socio-cultural theory (Burkett, 2013). In addition, it allows access to the same curriculum to all students (Watts-Taffe, Laster, Broach, Marinak, Connor & Walker-Dalhouse, 2012), maintains learning objectives within a constructivist context (Pranziou, 2015) and rejects the traditional role of the teacher, adopting the new role of facilitator (Mavroudi, 2017).

The dimension of modification of learning "products" seems to be an equally important feature of the definitions, as in many studies pedagogical differentiation is defined as a process in which students demonstrate the acquisition of knowledge based on their learning styles, interests and needs (Boges, 2015; Xanthou, 2015). In addition, many researchers consider that modifying students' learning "products" is an important feature of pedagogical differentiation (Koeze, 2007; Scott, 2012; Burkett, 2013; Harsono, 2016; Siam & Al Natour, 2016; Vassiliadou, 2017; Solberg, 2017) through which the acquisition of their new knowledge is proven (McLean, 2010).

Regarding the dimension of flexible learning context/flexible grouping, it appears that it is a dimension that is located to the same extent as the dimension of the modification of learning "products" in definitions or characteristics of pedagogical differentiation in primary education. This dimension is mentioned by some researchers as an important feature of pedagogical differentiation, as it is related to flexible and alternative

teaching approaches in terms of learning readiness, students' interests and learning profile (Fykaris, 2013). It is considered to be an active, quality and flexible approach to teaching (Burkett, 2013; Xanthou, 2015), which allows for flexible grouping of students (Kimberly, Grimes, & Stevens, 2009; Fykaris & Mitsi, 2012; Harsono, 2016; Mavroudi, 2017), the diversity and flexibility in the ways of receiving and expressing information (Tobin & Tippett, 2014) in a class of multiple levels or skills (Bantis, 2008).

The alternative/modern forms of assessment dimension are a feature of pedagogical differentiation for a smaller number of researchers. As mentioned, it allows teachers to provide more effective feedback so that students can determine the extent to which they have achieved their learning objectives (Flaherty & Hackler, 2010). Furthermore, several studies point out the importance of observation by teachers of differences and similarities between students for the planning of teaching (Xanthou, 2015) as well as the development of a detailed understanding of students' readiness, interests and ways of learning (Rodriguez, 2012), so that teachers enable all students to choose how to present their knowledge (Whipple, 2012; Pranziou, 2015) through the assessment of their functional and learning preferences (Reis, McCoach, Little, Muller, & Kaniskan, 2011).

To the same extent with the dimension of alternative/modern forms of assessment is identified the dimension of continuous improvement of the learning for all students in definitions or characteristics of pedagogical differentiation. Relevant publications point out that this dimension contributes to effective teaching and learning for all students (Reis, McCoach, Little, Muller, & Kaniskan, 2011; Valiandes, 2015; Siam & Al Natour, 2016) maximizing their learning abilities and capabilities (Pranziou, 2015; Stewart, 2016; Mavroudi, 2017). Other scholars report that this dimension reinforces the teacher-student relationship (Flaherty & Hackler, 2010) with the teacher's honest, fair and positive comments (Flaherty & Hackler, 2010) empowering students to progress to higher levels of functioning (Reis, McCoach, Little, Muller, & Kaniskan, 2011), with the quality upgrade of teaching (Fykaris, 2013). Also, some researchers point out that this dimension contributes to dealing with school failure (Sfyroera, 2004).

Regarding the dimension of success and active participation of the student in his learning, this is identified in an even smaller number of studies as a feature of pedagogical differentiation. In particular, some researchers refer to their definitions that this approach increases students' intrinsic motivation and interests (Flaherty & Hackler, 2010; Solberg, 2017), providing multiple ways to actively participate in knowledge acquisition (McLean, 2010; Reis, McCoach, Little, Muller, & Kaniskan, 2011; Tobin & Tippett, 2014). The active involvement of all students in the learning process (Tobin & Tippett, 2014), through mobilization (Reis, McCoach, Little, Muller, & Kaniskan, 2011), ensures success for all students (Flaherty & Hackler, 2010; Valiandes, 2015) by achieving the objectives of their curriculum (Mavroudi, 2017).

Subsequently, the dimension of development of life skills, such as the social skills of cooperation, collectivity, respect and empathy by students, is mentioned, but to a much lesser extent than the previous dimension, by some researchers as a characteristic of pedagogical differentiation, as it responds to their socialization needs (McLean, 2010).

Creating a safe and effective learning environment (McLean, 2010; Watts-Taffe, Laster, Broach, Marinak, Connor, & Walker-Dalhouse, 2012) promotes skills acquisition (Sfyroera, 2004) and fosters collaborative learning (McLean, 2010). Also, the focus on responsibility (Kimberly, Grimes, & Stevens, 2009) and the development of student responsibility (Flaherty & Hackler, 2010) are characteristics of pedagogical differentiation, which aim at taking greater collective and individual responsibility from students (Kimberly, Grimes, & Stevens, 2009) for their learning (McLean, 2010).

Regarding the dimension possibility of learning option/multiple options, this is mentioned by some researchers as a key feature of pedagogical differentiation as it provides a variety of approaches to what students learn (McLean, 2010; Boges, 2015), multiple learning opportunities (McLean, 2010) and multiple options for content acquisition by all students (Whipple, 2012; Pranziou, 2015).

The dimension of the development of procedural knowledge skills is a characteristic of pedagogical differentiation for an even smaller number of researchers. Indicatively, Sfyroera (2004) notes that it is pedagogical focused on the learning processes themselves and not on its results. Other researchers point out that it is the assurance of how a student learns (Boges, 2015). Pranziou (2015) also states that the contribution of the didactic approach to pedagogical differentiation lies in the fact that it enables all students to understand and process dynamic ideas.

Finally, the dimension with the lowest incidence is continuous assessment, as it is found in a relatively small number of surveys, which emphasize its special role in the teaching process, as it provides information on student progress and allows teachers to offer appropriate options (Karageorgou, 2013). Researchers also point out that pedagogical differentiation refers to assessment (Puzio, 2012) and with the continuous assessment of students

'learning readiness, interests and preferences (Harsono, 2016), academic monitoring of students' progress is achieved (Pranziou, 2015).

6. Conclusions

The present study focused on the conceptual analysis of pedagogical differentiation in primary education by gathering and examining elements of its definition in books, scientific texts and articles in journals and conferences.

In particular, the twelve dimensions were grouped into three in a broader category. In particular, modification of the supportive learning context, meeting the needs of the students, and the continuous improvement of the learning for all students were included in the category "processes". Student-centered teaching and learning, the flexible learning context/flexible grouping and the possibility of learning option/multiple options were included in the "context" category. The success and active participation of the student in his learning, the development of life skills and the development of procedural knowledge skills were included in the category "learning outcomes". Finally, the modification of learning "products", the alternative/modern forms of assessment and the continuous assessment were included in the category "assessment".

The results of the research showed that in primary education in the category "processes" the dimension of modification of the supportive learning context appeared more often, in the category "context" the dimension of student-centered teaching and learning, in the category "learning outcomes" the success and active participation of the student in his learning and in the category "assessment" the modification of learning "products".

In detail, "processes" seem to be characterized mainly by the dimension of the modification of the supportive learning context, as pedagogical differentiation is defined as the adaptation of teaching by teachers to different learning styles, interests and prior knowledge of students, modifying resources and in settings and adjustments in a regular class. The next dimension, which concerns the meeting the needs of students, which aims to meet the diverse and different individual needs of students within a heterogeneous class, contributing to the overcoming of inequalities and the promotion of social justice, seems to characterize the "processes", to a lesser extent than the previous dimension. To an even lesser degree appears the dimension of continuous improvement of the learning for all students, which contributes to effective teaching and learning for all students by maximizing their learning abilities and possibilities by upgrading the quality of teaching.

The "context" is primarily characterized by student-centered teaching and learning, as many researchers define pedagogical differentiation as a strategy that puts students' learning needs at the heart of teaching, contributing to the achievement of their learning goals. To a lesser extent, the dimension related to the flexible learning context/flexible grouping appears, which is related to flexible and alternative teaching approaches in terms of learning readiness, students' interests and their learning profile and is an active, quality and flexible approach to teaching, which allows flexible grouping of students. Possibility of learning option/multiple options is the third dimension of the "context" and is mentioned as a key feature of pedagogical differentiation, as it provides a variety of approaches to what students learn, multiple learning opportunities and multiple content acquisition options by all students.

From the category "learning outcomes" stands out the dimension of success and active participation of the student in his learning, which is related to increasing the internal motivation and interests of students, providing multiple ways of active participation in the acquisition of knowledge and ensuring success for all the students. The dimension of the development of life skills appears to a lesser extent in the definitions of pedagogical differentiation compared to the previous dimension and is related to the socialization needs of students creating a safe and effective learning environment, which favors the acquisition of skills and cultivates collaborative learning. The development of procedural knowledge skills is the last dimension in this category and is related to the learning processes themselves, on which this approach focuses, and not to its results, enabling all students to understand and process dynamic ideas, ensuring how a student learns.

Finally, in the category "assessment" the dimension of modification of learning "products" has the largest presence, as by many scholars pedagogical differentiation is defined as a process in which students demonstrate the acquisition of new knowledge based on learning styles, interests and their needs. To a lesser extent, the dimension of alternative/modern forms of assessment appears, based on which teachers are given the opportunity to provide more effective feedback, so that students can determine the degree of achievement of their learning objectives. To an even lesser extent appears the dimension of continuous assessment which is related to the teaching process by providing information about students' progress and allowing teachers to offer the appropriate options in order to improve their students' learning. With the continuous assessment of the learning readiness, the interests and the preferences of the students, the academic monitoring of the students' progress is achieved.

It follows from the above conclusions that the twelve dimensions of pedagogical differentiation were identified to varying degrees in the various studies. Therefore, more research is needed in order to formulate a more limited conceptual content of pedagogical differentiation and a more complete presentation of its dimensions in primary education.

References

Bantis, A. M. (2008). *Using task based writing instruction to provide differentiated instruction for English language learners* (Master of Science, University of Southern California).

Boges, C. (2015). *The Effects of Differentiated Instruction on the Achievement Scores of Struggling Fourth Grade Readers* (Doctoral dissertation, Walden University).

Burkett, J. A. (2013). *Teacher perception on differentiated instruction and its influence on instructional practice* (Doctoral dissertation, Oklahoma State University).

Cannon, M. (2017). *Differentiated Mathematics Instruction: An Action Research Study* (Doctoral dissertation, University of South Carolina).

De Jesus, O. N. (2012). Differentiated Instruction: Can Differentiated Instruction Provide Success for All Learners? *National Teacher Education Journal, 5*(3), 5-11.

Flaherty, S., & Hackler, R. (2010). *Exploring the effects of differentiated instruction and cooperative learning on the intrinsic motivational behaviors of elementary reading students* (Master of Arts in Teaching and Leadership, Saint Xavier University Chicago, Illinois).

Frey, B. B., & Schmitt, V. L. (2006, April). Coming to terms with classroom assessment: Are performance-based assessments authentic or visa-versa? Presented at the *Annual Meeting of the American Educational Research Association, San Francisco*.

Frey, B. B., Petersen, S. E., Edwards, L. M., Pedrotti, J. T., & Peyton, V. (2005). Item-writing rules: Collective wisdom. *Teaching and Teacher Education, 21*, 357-364. https://doi.org/10.1016/j.tate.2005.01.008

Frey, B. B., Schmitt, V. L., & Allen, J. P. (2012). Defining authentic classroom assessment. *Practical assessment, research & evaluation, 17*(2). Retrieved from http://pareonline.net/getvn.asp?v=17&n=2

Fykaris, I. (2013). The meaning of "differentiation" in teaching practice: presentation of teaching planning for primary school students. In S. Padeliadu, & D. Filippatou, (Eds.), *Differentiated teaching. Theoretical approaches and educational practices* (pp. 225-244). Athens: Pedio.

Fykaris, I., & Mitsi, P. (2012). Approaching Differentiated Instruction via the Attitudes and the Opinions of Greek Primary School Teachers: An Empirical Investigation. *Sociology Study, 2*(12), 918-926.

Gregory, G. H., & Chapman, C. (2013). *Differentiated instructional strategies: One size doesn't fit all*. Thousand Oaks, CA: Corwin Press.

Harsono, M. (2016). *The Impact of Lesson Study on Primary School Teachers' Knowledge and Skills in Differentiating Primary School Mathematics Instruction: A Digital Mixed Methods Approach* (Dissertation, Curtin University).

Heacox, D. (2014). *Differentiating Instruction in the Regular Classroom: How to Reach and Teach All Learners*. Free spirit Publishing.

Hockett, J. (2010). *The influence of lesson study on how teachers plan for, implement, and understand differentiated instruction* (Dissertation, University of Virginia).

Kanakis, I. N. (2007). The internal differentiation of teaching and learning (concept, theoretical foundation, aspirations). At *8th conference of the Cyprus Educational Group*. Teaching in mixed ability classes. April 21, 2007 (pp. 21-35). Nicosia.

Karageorgou, H. (2013). Differentiation of the learning environment and the teaching of the Language in the first grades of primary school. In S. Padeliadu, & D. Filippatou (Eds.), *Differentiated teaching. Theoretical approaches and educational practices* (pp. 185-224). Athens: Pedio.

Kimberly, Grimes, K. J., & Stevens, D. D. (2009). Glass, Bug, Mud. *Phi Delta Kappan, 90*(9), 677-680. https://doi.org/10.1177/003172170909000914

Koeze, P. (2007). *Differentiated Instruction: The effect on student achievement in an elementary school* (Doctoral dissertation, Eastern Michigan University).

Maddox, C. (2015). *Elementary (K-5) Teachers' Perceptions of Differentiated Instruction* (Doctoral dissertation, Walden University).

Manolakos, P. (2012). Differentiation of teaching. An application of it in Mathematics of the 4th grade. At *6th Panhellenic Conference of the Hellenic Institute of Applied Pedagogy and Education (HELLIEPEK)*. Education is best for you: Humanities and Positive Sciences: Theory and Practice. 5-7 October 2012 (pp. 1-11). Athens.

Mavroudi, A. (2017). Implementing differentiated instruction in the Greek state primary school: Teachers' attitudes and preferred differentiated strategies. *22nd International Symposium on Theoretical and Applied Linguistics* (pp. 372-385). Aristotle University of Thessaloniki.

McLean, V. (2010). *Teacher Attitude Toward Differentiated Instruction in Third Grade Language Arts* (Doctoral dissertation, University of Southern Mississippi).

Pranziou, I. (2015). *Differentiation of Teaching and Production of Written Argumentation in School Age* (Bachelor's thesis, School of Humanities and Social Sciences, Department of Preschool Education, University of Thessaly).

Puzio, K. (2012). *Social and organizational influences on literacy differentiation: A mixed methods study* (Doctoral dissertation, Vanderbilt University).

Reis, S., McCoach, D., Little, C. A., Muller, L. M., & Kaniskan, R. (2011). The Effects of Differentiated Instruction and Enrichment Pedagogy on Reading Achievement in Five Elementary Schools. *American Educational Research Journal, 48*(2), 462-501. https://doi.org/10.3102/0002831210382891

Rodriguez, A. (2012). *An Analysis of Elementary School Teachers' Knowledge and Use of Differentiated Instruction* (Doctoral dissertation, Olivet Nazarene University).

Scott, B. (2012). *The effectiveness of differentiated instruction in the elementary mathematics classroom* (Doctoral dissertation, Ball State University Muncie, Indiana).

Sfyroera, M. (2004). *Differentiated Pedagogy. In the collective project Education of Muslim Children entitled Keys and Anti-Keys*. Athens: Ministry of Education, University of Athens. Retrieved from http://www.kleidiakaiantikleidia.net/book18/book18.pdf

Siam, K., & Al Natour, M. (2016). Teacher's Differentiated Instruction Practices and Implementation Challenges for Learning Disabilities in Jordan. *International Education Studies, 9*(12). https://doi.org/10.5539/ies.v9n12p167

Solberg, M. (2017). *The Differentiated English Classroom. Teachers' approaches to differentiated instruction in group lessons in lower secondary school* (Master, University of Oslo).

Stewart, O. S. (2016). *Teachers' Perceptions of Differentiated Instruction in Elementary Reading* (Doctoral dissertation, Walden University).

Tobin, R., & Tippett, C. (2014). Possibilities and potential barriers: learning to plan for differentiated instruction in elementary science. *International Journal of Science and Mathematics Education, 12*, 423-443. https://doi.org/10.1007/s10763-013-9414-z

Tomlinson, C. A. (2000). Reconcilable Differences? Standards-Based Teaching and Differentiation. *Educational Leadership, 58*(1), 6-11.

Tomlinson, C. A. (2014). *The Differentiated Classroom: Responding to the Needs of All Learners* (2nd ed.). Alexandria, VA: Association for Supervision and Curriculum Development.

Valiandes, S. (2015). The differentiation of teaching in mixed capacity classes through the experiences of teachers and students: A qualitative investigation of its effectiveness and the conditions of its application. *Educational Sciences, 1*, 7-35.

Valiandes, S., & Neophytou, L. (2017). *Differentiated teaching, functional and effective implementation*. Athens: Pedio.

Vassiliadou, C. (2017). *Evaluation of the views and implementation strategies of the Differentiated teaching of Greek teachers of Primary education* (Bachelor's thesis, School of Social Humanities and Arts, Department of Educational and Social Policy, University of Macedonia).

Watts-Taffe, S., Laster, B. P., Broach, L., Marinak, B., Connor, C., & Walker-Dalhouse, D. (2012). Differentiated Instruction: Making Informed Teacher Decisions. *The Reading Teacher, 66*(4), 303-314.

https://doi.org/10.1002/TRTR.01126

Whipple, K. A. (2012). *Differentiated instruction: a survey study of teacher understanding and implementation in a southeast Massachusetts school district* (Doctoral dissertation, Northeastern University, Boston, Massachusetts).

Wormeli, R. (2005). *Busting Myths about Differentiated Instruction*. Principal Leadership, National Association of Secondary School Principals.

Xanthou, E. (2015). *Teaching English through Differentiated Instruction in Greek State Primary Schools*. Partial Fulfillment for the Degree of Master of Arts in Teaching English as a Foreign Language Department of Theoretical and Applied Linguistics, School of English Language and Literature, Aristotle University of Thessaloniki.