

# **Di**fferentiation of instruction for teacher professional **De**velopment and students' **Su**ccess»

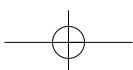
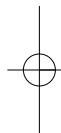
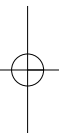
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# Teachers' Guide to Differentiated Instruction

Edited by Stavroula Valiandes & Lefkios Neophytou

Nicosia  
May 2017



# Teachers' Guide to Differentiated Instruction

**Edited by** Valiandes Stavroula and Neophytou Lefkios

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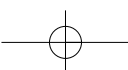
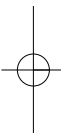
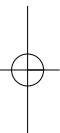


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## Editors' foreword:

### **Differentiation of Instruction for the Professional Development of Teachers and students' Success (DiDeSu).**

#### ***Not just an EU funded project....a partnership, a community and an ethos.***

Contemporary classrooms are comprised of diverse student population. The coexistence of students of different aptitudes, socio economic origin, culture and ethnicity in each and every classroom, makes teachers' work much more complex and challenging. Teachers, being at the cutting edge of an educational endeavour, are expected to differentiate their instruction in order to fulfil the needs of all students in mixed ability classrooms. Nevertheless, in many cases, teachers have not been properly prepared for such a demanding task.

Acknowledging these demanding realities, as well as the burden placed upon teachers, the DiDeSu project was developed, in an effort to create the tools and methods to be employed for effective teacher training and support programs, with a clear focus on helping teachers, effectively and sustainably, apply differentiated instruction and thus respond to the needs of all students in mixed ability classrooms.

By engaging teacher training institutions from four European countries (Cyprus, Romania, Slovenia and Spain) while training, supporting and mobilizing many teachers from elementary schools in all the aforementioned countries, DiDeSu has succeeded in developing the incubators of differentiated instruction: schools and teachers that learned how to design, deliver and evaluate differentiated instruction. Teachers and school communities that believed in and embraced differentiation, are now identified as its ambassadors and showcases thus providing examples of effective teaching practices to others.

The project took place within the period from September 2015 to September 2017 and was coordinated by the Pedagogical Institute of Cyprus. Furthermore, the consortium of the project consisted of the "Vasile Alecsandri" University of Bacau Romania, the Universitario de Cartuja, Granada, Spain and the Educational Research Institute of Slovenia.

DiDeSu established an ethos of collaboration within every individual participating school, by enabling teachers to rely on their own knowledge and expertise, apply peer coaching practices, jointly design lessons, develop instructional material, observe lessons of their colleagues, evaluate, reflect and improve their practices. An ethos facilitated by the implementation of some "scaffolding" processes in the provision of support to teachers: Exterior expert support aimed at developing in-house expertise. As teachers became more familiar with the skills needed to implement differentiated instruction, exterior support was gradually reduced, thus allowing teachers to become the instructional leaders of their peers. Thus, the project aimed to develop "learning communities of practice" that would not only rely on exterior experts, but would utilize their own human resources to provide the ongoing training and support needed by their faculty. The scaffolding approaches not only empowered teachers but also provided an effective solution for handling the scarcity of resources in teacher training. The ratio expert/teacher was reduced, since teachers themselves became experts and through their own professional development were able to foster the professional development of their peers.

By utilizing contemporary ICT tools, like web-pages, social networks (Facebook) discussion forums and web based learning platforms, DiDeSu enhanced the development of ICT

literacy to teachers, thus enabling them to communicate with their colleagues, exchange ideas and share instructional material. DiDeSu e-class<sup>1</sup> on differentiation of instruction, is a web based learning platform that was developed within the framework of the project, that became a useful resource which enabled participants to learn/ exchange ideas/ upload lesson plans and discuss with their peers and their trainers (at a local and a European level) through blogs/forums. The e-class and its resources are widely available, not only to the participants of the project but to anyone who is interested in differentiation.

The prime target group of the project was primary school teachers. For this purpose, two series of workshops on Differentiation of Instruction, along with two series of workshops on Lesson Observation and Evaluation, were developed and delivered in all participating countries. Through these workshops, a number of teachers were able to familiarize themselves with the content, skills and techniques needed for the effective implementation of differentiated instruction and enhance their lesson observation skills. Each series of workshops, on each topic, had a 15-hour duration and were distributed in 5 three-hour meetings. Participants covered a wide range of topics and disciplines (e.g. maths, language, geography, history) and engaged in hands on activities that enabled them to design, implement and evaluate lessons. By utilizing a blended approach, the workshops addressed both theory and practice. Thus, there was sufficient time between the various consequent meetings that allowed participants to apply in their schools the knowledge and skills they had acquired and then reflect and discuss them with the rest of the participants in the workshop. The second series of seminars took place after the evaluation of the first series, thus enabling teacher trainers to optimize the content and methods of the seminars. All material used in the workshops was uploaded on the e-class, therefore becoming available to all teachers who want to use it.

Two training events took place for the preparation of these workshops. The first training event took place in Ljubljana, Slovenia, in December 2015 and the second in Granada, Spain, in September 2016. During these training events, teacher trainers from the consortium of the project jointly developed the material that was going to be used in the workshops. The jointly developed material was produced in English and afterwards translated in the language of the participants, ready to be used during the workshops.

Two international conferences took place within the framework of DiDeSu, one in Romania and one in Cyprus: the “1st International Conference on Innovations in Psychology, Education and Didactics” (ICIPED<sup>2</sup> in Romania ) and the “International Conference on Differentiation of instruction for the professional Development of teachers and students’ Success in Cyprus” (DiDeSu).<sup>3</sup> These conferences brought together experts, academics and practitioners from a wide range of disciplines across the globe, to discuss the various options and strategies for the effective implementation of differentiation of instruction in contemporary classrooms. Thus, links were created between the scientific research and

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1. <http://didesu.cy.net/>

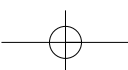
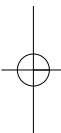
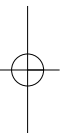
2. The ICIPED, took place from 10th - 11th March 2017 in Bacau, Romania and was realized via the collaboration between the Journal of Innovation in Psychology, Education and Didactics, Vasile Alecsandri University of Bacău, and Psychreg. <http://www.iciped.psychreg.org/>

3 The International Conference on Differentiation of instruction for the professional Development of teachers and students’ Success (DiDeSu) took place in Nicosia on the 26 - 27 May 2017 <http://didesu.cy.net/>

practice, while various strategies and approaches to differentiation were discussed. In this sense, the conferences provided suggestions and useful insights that could help not only in the implementation of differentiation, but also in the professional development of teachers by providing learning and support towards the sustainable inclusion of differentiation in their everyday practices.

This book gathers and presents some of the best practices that have emerged during the two year period of the project and reflects the hard work that was carried out by all partners, towards the realization of its objectives. It includes case studies, good practices and methodological guidelines that derived from the implementation of the project. We sincerely hope that teachers will find it useful and resourceful in their everyday struggle to respond to the needs of all students in contemporary mixed ability classrooms.

# *English Section*



## 1. Conceptualizing Differentiation of Instruction and its implementation in classroom

A major disadvantage of traditional instruction is that teachers mainly “teach to the middle”, since students are treated as if they are all the same. This means that the needs of an increased number of students will not be satisfied (Rock, Gregg, Ellis, & Gable, 2008).

Differentiated Instruction (DI) can be the answer to this problem. Teachers, during DI, adapt their instruction according to the learners’ individual differences. Differentiated instruction is a philosophy and a pedagogical approach in which teachers design and plan their instruction based on students’ readiness levels, interests, learning profile, personal characteristics and other factors that can affect learning. Instruction is therefore adapted accordingly, as an answer to the variability and diversity of learners (Smit & Humpert, 2012).

Based on the theory of differentiated instruction, we may identify certain specific characteristics of differentiation of instruction that are under the direct control of the teacher (Bellman, Foshay, & Gremillion, 2014; Koutselini, 2008; Maeng & Bell, 2015; Smit & Humpert, 2012; Valiandes, 2015). These refer to the teachers’ knowledge, attitudes and skills along with the specific presuppositions that a teacher needs to consider when designing and delivering differentiated lessons. It is therefore expected that the teacher:

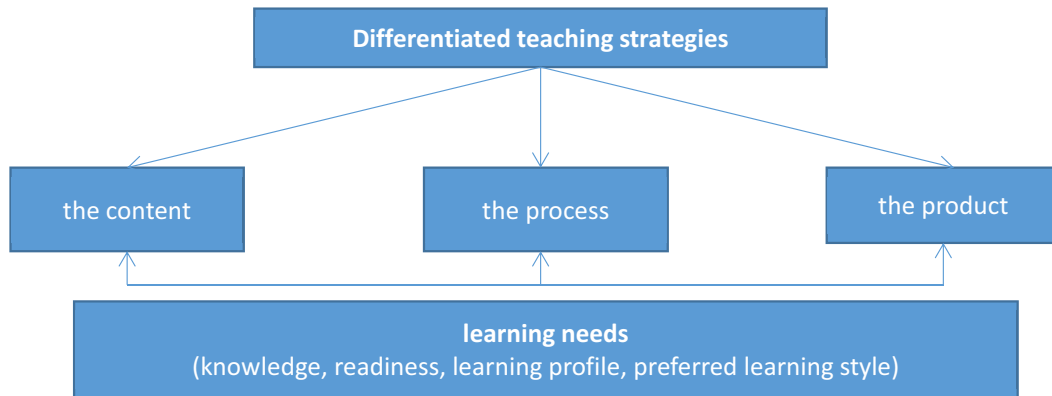
- Has an adequate knowledge of the subject which is to be taught;
- Has a very good understanding of the students’ differences and individualities, their wishes and interests, their strong and weak points etc;
- Is able to meet students’ differences and individualities;
- Adjusts and changes the learning content and method depending on students’ responses;
- Collaborates and interacts with students during the learning process;
- Ensures variable access to content, the learning process, the learning environment, or product (the mode in which a student takes their understanding of the content), even though keeping the same general learning objectives for all students;
- Maximizes students’ engagement time in the learning process and the time students have to work for the completion of a task.

Effective differentiation utilizes various methods and instructional approaches, by integrating them into a cohesive, robust instructional design that balances students’ characteristics and curricular demands. In order to establish how teachers can prudently integrate instructional approaches, Taylor defines a model for differentiated instruction. From this perspective, Taylor “discusses how secondary teacher candidates learn to focus on **content—the “what” of instruction; process—the “how” of instruction; and product—the “evidence” of instruction**” (Taylor, 2015). On the basis of these assumptions, it is possible to identify three major axes on which differentiated instruction can be implemented (Rock et al., 2008; Telford, 2007):

- **Differentiating content:** the “what” of instruction;
- **Differentiating process:** the “how” of instruction;
- **Differentiating product:** the “evidence” of instruction.

According to Tomlinson (2000), teachers can differentiate their instruction by using

strategies that alter the content (how information is presented), the process (how students interact with the material presented), and the product (how students demonstrate their understanding and learning) based on diverse learning needs in terms of background knowledge, readiness, learning profile, and preferred learning style (Diagram 1).



**Diagram 1.** Illustration of Tomlinson's model of differentiated instruction (Tomlinson, 1995, 2000, 2001)

Differentiated instruction has gained increased attention over the past decade as an innovative instructional practice that can face the challenges of contemporary classrooms. Although, differentiated instruction has been seen by several scholars from different points of view, nevertheless they all agree that DI is the way to respond to the variance of students' needs.

- An instruction that is proactively planned by the teacher to be robust enough to address a range of learner needs, in contrast with planning a single approach for everyone and reactively trying to adjust the plans when it becomes apparent that the lesson is not working for some of the learners for whom it was intended (Tomlinson, 2001).
- A process approach to teaching and learning for students of differing abilities in the same class (Hall, Strangman, & Meyer, 2002).
- An instruction that requires a more conscious effort to analyse available data and make decisions about what is working and what needs to be adjusted (Gregory & Chapman, 2007).
- Differentiation of teaching and learning is the today's challenge for teachers to act as curriculum developers in micro-level. However, teachers cannot differentiate students' performance if they do not employ simultaneously to differentiated instruction processes for image construction and emancipation, which could balance the social inequalities (Koutselini & Agathagelou, 2009).
- An instruction that may be made by teachers based on what they know about students' learning preferences (i.e., intelligence, talents, learning styles), allowing students' choices in working independently, with partners, or as a team; or providing varied work spaces that are conducive to various learning preferences (i.e., quiet work spaces, work spaces with tables instead of desks) (Ireh & Ibeneme, 2010)
- An interesting option for use in regular classrooms as well, classrooms where learning has become student oriented and collaborative and where all students are successfully and meaningfully challenged (Smit & Humpert, 2012).
- An instructional design model ... that guarantee effective learning for varied indi-



viduals' that is realized through a well-designed curriculum and student-centered instruction that joins to differences in student **readiness** (student's knowledge, understanding, and skills related to a particular sequence of learning), **interest** (those topics that induce curiosity and passion in a learner), and **learning profile** (how a student learns best with regard to their learning style, intelligence preference, culture, and gender (Maeng & Bell, 2015).

- "Teaching and learning that aims to obtain a match between learning tasks and activities on the one hand, and the needs of individual learners on the other hand, to maximize students' growth (De Neve, Devos, & Tuytens, 2015).
- Within the context of differentiated instruction, equity is the opportunity that all groups of students have in a mixed ability classroom to fulfil the curriculum's goals to the maximum, according to their personal abilities and competences, ensuring thus equal access to knowledge for all (Valiandes, 2015).

It should be noted that differentiation does not lie within the discretion of every individual teacher. **A rights-based approach to differentiation** (Neophytou & Valiandes, 2017) "involves acknowledging that children are not citizens-in-waiting, but instead they are individuals who have rights now, including the right to have a voice in participating in decisions that affect them. It also involves enacting critical reflexivity and rethinking deeply embedded notions about the roles of teachers and students in the teaching and learning process" (Unicef, 2012, p.11). **Hence, it is not charity neither it lies within the discretion of every teacher to differentiate his/her instruction. It is an obligation of the state and the teacher to protect the rights of every child attending a mixed ability classroom.** To this end, differentiation appears to be the optimum, so far, way to achieve it.

Over the years, there has been a growing body of research regarding the multiple aspects of DI. During the last 5 years, there have been many researches that identify the effectiveness of differentiated instruction in various educational settings and subjects (Aliakbari, & Haghighi, 2014; Joseph, Thomas, Simonette & Ramscook, 2013; Landrum & McDuffie, 2010; Reis, McCoach, Little, Muller & Kaniskan, 2011; Simpkins, Mastropieri, Scruggs, 2009; Valiandes, 2015). To sup up, we can say that differentiated instruction has been recognized as a controlling approach for narrowing students' achievement gap (Bellman et al., 2014; Valiandes, 2015).

Despite the various studies that highlight the strengths of differentiated instruction, nevertheless certain critical voices may arise, mainly due to the common misconceptions that may be related to differentiated instruction:

- assumptions that students labelled with "less developed readiness" need more direct instruction and routine practice over inquiry-based pedagogical approaches (Bannister, 2016);
- if teachers differentiate instruction, they create unfair capabilities among students (Rock et al., 2008);
- the differentiated instruction model has the improbable capacity to prevent within-classroom following practices (Bannister, 2016);
- teachers claim that differentiation is time consuming and difficult to prepare and implement (Corley, 2005; Nunley, 2006);
- teachers believe that to differentiate you have to prepare different activities for different students (Valiandes, 2015).

As teachers are the key towards the implementation of effective differentiated instruction, the level of one's pedagogical knowledge has an important and crucial role in this

process (Kyriakides, Cremmers, Antoniou, 2009; Valiandes & Neophytou, 2017a). Teachers need to have a deep knowledge of the philosophy and pedagogical approach of differentiation in order to implement it. Teachers need to change the way they think about planning, designing and providing instruction towards a more student-centered approach; an approach that is mainly based on the assumptions of how “my” students can work, will respond, will learn, what will be difficult or very easy for them etc.

Nevertheless, teachers should not be scapegoated if an educational system does not properly support them in their quest for differentiated instruction. Teachers need to be supported in their effort to differentiate their instruction through consistent training and support (Affholder, 2003; Smith, 2011; Valiandes & Neophtou, 2017a). To this end, traditional top-down, one shot, lecture approach seminars are unable to convince their participants to embrace and sustain the proposed instructional changes. Successful programs are those developed according to teachers’ needs and those that provide ongoing support and feedback by experts or mentors for sustainable change. Furthermore, effective teacher development is not limited only to instructional skills, but further aims to develop teachers’ research and inquiry skills by empowering them to become reflective practitioners. The emphasis is now placed in the creation of high quality professional development programs, characterized by: active learning, collective participation, a focus on content knowledge and instructional methods and are closely related to the curriculum and the existing teaching realities and have sufficient duration and continuance (Valiandes & Neophytou, 2017b). Improving school effectiveness has been correlated with improving teacher effectiveness and similarly teacher effectiveness can indeed be improved by a quality teachers’ professional development and learning program.

Notably, differentiation is not the easy way out of the traditional “one size fits all” approaches, but it can most definitely contribute towards the improvement of instructional effectiveness and the growth of all students in mixed ability classrooms. Differentiation, as an instructive approach, aims to maximize the learning opportunities for every student. Therefore, it may be considered as a response to the criticism of technocratic and positivist tradition, proposing, as Tomlinson (2001) points out, a change and adoption of the teaching practices that will affect and shape dynamically the learning process, based on the teaching routines that correspond to the diversity of student population, found in each and every mixed ability classroom.

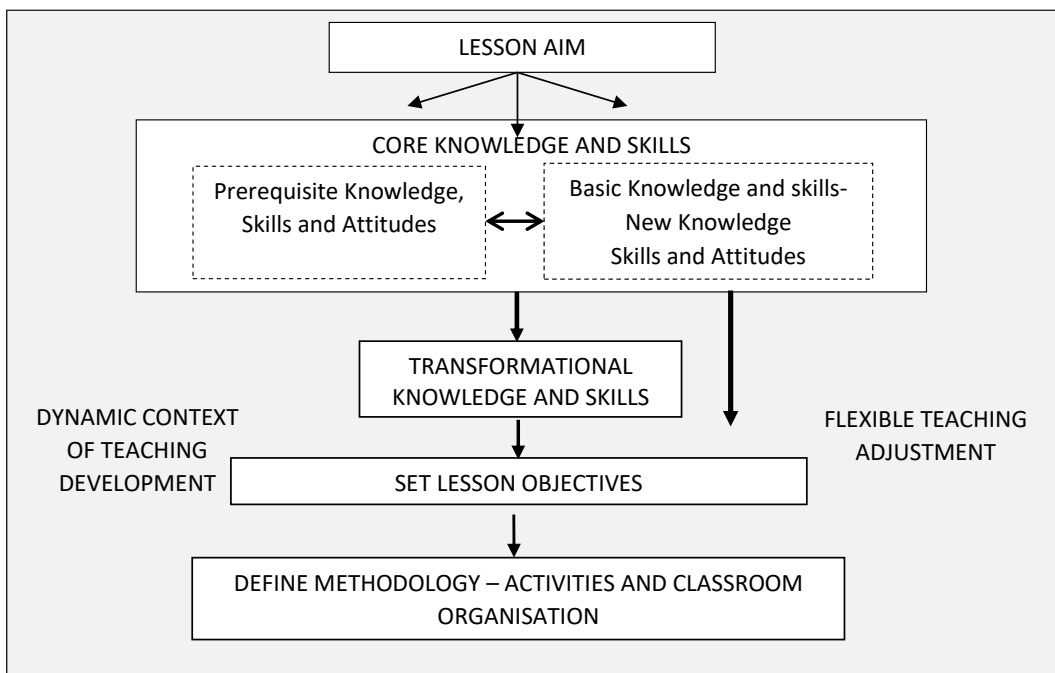
## 2. Designing and Planning Differentiated Instruction

Differentiation of Instruction, as will be demonstrated further on, is a dynamic, flexible, interactive and reflective learning process. Despite its dynamic character, differentiation of instruction needs to be designed and planned in advance, while taking into consideration students’ needs and characteristics and the teacher’s instructional profile. That’s why there is no unique way to differentiate one’s teaching. Since DI is a unique process for each teacher in each classroom, teachers must always be aware who they will teach and what these students need and can learn.

Consequently, prior to designing a lesson, a teacher must assess his/her students’ readiness level and take into consideration their learning profile, emotional and social needs and interests. Although most mixed-ability classes may have up to 5 readiness levels (Koutselini, 2008), for the purposes of planning and the implementation of differentiation, students can be grouped into three levels: (a) those below the classroom’s average, (b) those who are approximately near the classroom’s average and (c) those who are well above the classroom’s average. These groups should not be announced to students, instead they

should be used by the teacher to design activities accordingly, in order to provide opportunities for all students to work and learn.

Teacher's scientific knowledge about the discipline of one's instruction or/and on the instructional/curricular topic subject, guide the setting of the **lesson aim and objectives**. Identifying and setting the basic **core knowledge** that all students must acquire, comprises the basic element of differentiated instruction, as it ensures that all objectives, activities and assessment goals will be achieved. Then, the core, basic **knowledge** (new knowledge), **prerequisite knowledge** (knowledge that is necessary to be able to acquire the basic knowledge) and **transformational knowledge** (knowledge that extends beyond the basic and prerequisite knowledge) must be clearly defined. Transformational knowledge mainly aims at students who are more advanced than the main target group, as defined by the curriculum. It may even refer to gifted students (Koutselini 2006, p. 87) (Diagram 2).



**Diagram 2: Preparation for the planning of differentiated instruction.** Adapted from Koutselini, M. (2006).

## 2.1. The steps towards differentiated instruction

### 2.1.1. Determine the Aim in a Differentiated Instruction Lesson

Lesson planning begins by defining the main aim of the lesson, based on the subject's content as defined in the curriculum, yet adapted to meet the readiness level of the students in each specific classroom. The lesson aim is very important since it guides the setting of the lesson objectives that all students should acquire.

### 2.1.2. Defining the core (prerequisite and basic) knowledge and skills

Having set the teaching aim, it is now important to define the core knowledge and skills,

that all students should acquire, based on the framework that the curriculum establishes. This knowledge and skills are considered to be useful and necessary to learners and should therefore formulate the minimum level of knowledge, skills and attitudes that each and every student, regardless his/her aptitude, should master by the end of the lesson. Differentiated instruction is based upon this core knowledge (Koutselini, 2008; Tomlinson & Allan, 2000; Valiandes, 2015), as it ensures that all students will be given the opportunity to learn it. To ensure this, a teacher must prepare a lesson plan that provides students with opportunities to gain new skills and new knowledge and also allow them to use, apply and finally transform it so as it becomes their own personal knowledge.

Both prerequisite and basic knowledge are part of what we call fundamental knowledge and should be taken into consideration when planning instruction. Prerequisite knowledge/skills are identified as the knowledge/skills that a student should acquire before constructing new knowledge, while basic knowledge/skills are the knowledge/skills that a student should acquire after completion of the lesson.

Taking into consideration that a student has to acquire the prerequisite knowledge in order to be able to construct new knowledge, there is a need to perform pre-assessment, so that students have the opportunity to retrieve and refresh their prerequisite knowledge and the teacher to be able to identify any misconceptions or weaknesses that the students may have. Most of the times, teachers assume that any prerequisite knowledge is also pre-existing, meaning that students have acquired the specific knowledge from previous lessons. This, however, should not be taken for granted unless this knowledge and/or skills had been taught and assessed shortly before and students had been identified as having acquired the specific content.

Instructional objectives that are based on core knowledge and skills, constitute the foundation for differentiated instruction as they help teachers to remain focused on what they want to achieve. At the same time, objectives guide the constant and formative assessment which is an excellent source of information regarding the dynamic differentiation of teaching. By setting the objectives, teachers know in advance what their students should learn by the end of the lesson and what exactly they should assess (by setting high realistic expectations for all).

### **2.1.3. Defining the transformational knowledge and skills**

Every instructional planning, in addition to the prerequisite and basic knowledge, should define the **transformational knowledge and skills** to be acquired. These move beyond the prerequisite and basic knowledge and address the more advanced or even gifted students. Transformational knowledge is not about being able to recall or implement the newly instructed knowledge. It requires that students analyze, derive rules, generalize and evaluate (Neophytou & Valiandes, 2015; Valiandes, 2013). Transforming knowledge constitutes a challenge for students as it requires them to have a deeper understanding of the new knowledge and help them solve more complex problems. It is important for the teacher to be aware of the students' abilities and limitations so as to make sure that the challenge of transforming their knowledge is realistically attainable, depending on their readiness level. Anything contrary to that could have some negative short-and long-term results. If the cognitive task is too complex and the transformational process is too demanding, then students would most definitely need assistance that the teacher would most likely not be able to deliver. This could make students anxious, frustrated and disappointed and may result into the development of a negative attitude towards any future activity (Valiandes & Neophytou, 2017b). Two examples of an original differentiated instruction planning based on the aforementioned steps, are presented below (Valiandes, 2013).

**Example 1: Language Lesson in Elementary School**

**Aim:** Students should be able to argue in favour of or against watching TV by using causative sentences.

**Prerequisite Knowledge and skills:**

- Prior knowledge and experiences students had while watching TV
- Collaboration and communication skills
- Basic argumentative skills and concepts (giving an opinion, making an argument in favour of, or against something, create a counterargument)
- Argumentation structure-creation of an arguments map

**Basic Knowledge and Skills:**

Students should be able to:

- Identify the pros and cons of watching TV through some relevant texts
- Formulate their own arguments to support their opinion
- Make use of causative sentences to differentiate their arguments
- Organize their arguments (in favour/against) on an argument map
- Utilize the argument map as a supporting tool when they find themselves in an interactive exchange of arguments

**Transformational Knowledge and Skills:**

- Students are able to contradict the other group's arguments by using counterarguments
- Students create a poster or a list or an arguments map or write an article that refers to the positive and negative attributes of TV.

**Example 2: Mathematics Gymnasium****Aim:**

Students should be familiar with the Pythagorean Theorem and should be able to apply it in order to solve problems

**Prerequisite Knowledge and skills:**

Students should be able to:

- Draw a right angle triangle and name its sides (hypotenuse, vertical sides)
- Calculate the power on a positive basis by having number 2 as an exponent (mentally or with a calculator)
- Calculate the square root of natural numbers (mentally or with a calculator)
- Calculate the area of a square.
- Solve a 2nd degree equation with an unknown quantity e.g.  $x^2 = \alpha$ , where  $\alpha \geq 0$ .

**Basic knowledge and skills- Objectives**

By the end of the lesson students should be able to:

- Present orally the relation between the sides of a right angle triangle
- Translate the Pythagorean Theorem from verbal language to algebraic language
- Identify the presuppositions to applying the Pythagorean Theorem
- Solve simple exercises – everyday problems by applying the Pythagorean Theorem

**Transformational Knowledge and skills**

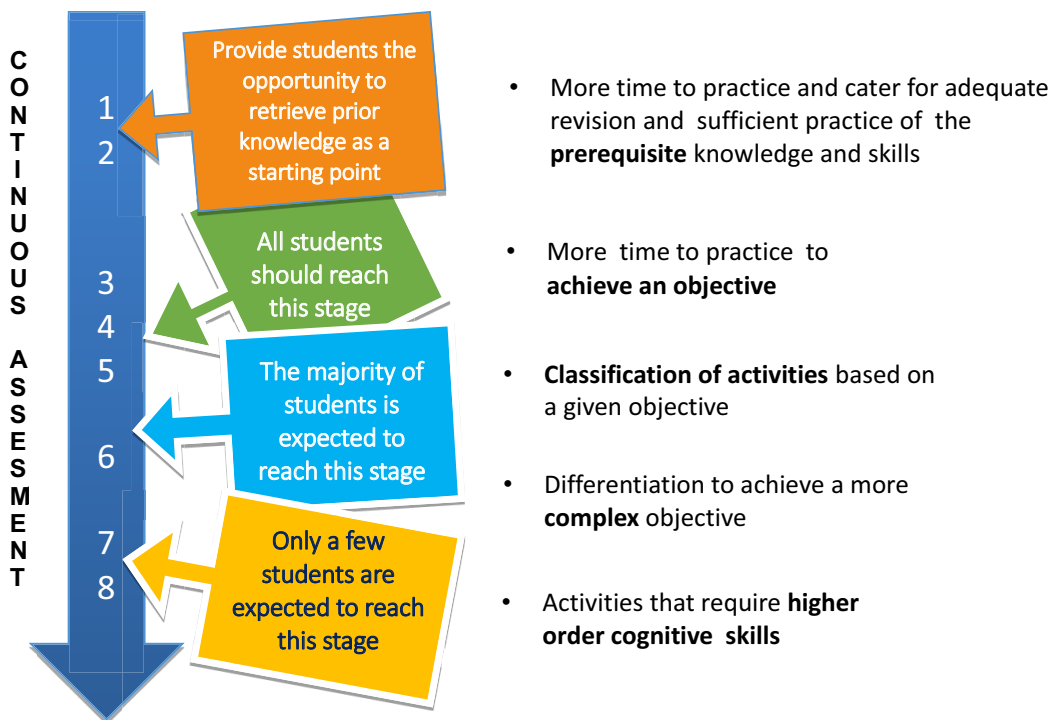
- Solve more complex exercises – everyday problems by applying the Pythagorean Theorem
- Use the Pythagorean Theorem in reverse to prove that a triangle is indeed a right angle one.

### 2.1.4. Designing the course of Differentiated instruction, students' work and learning

Based on the above, teachers should be able to decide which teaching techniques and strategies they could employ in order to ensure that all students will be engaged in the learning process and will be working on a task, so as to acquire the basic fundamental knowledge and skills. Teachers should also keep in mind that even the most sophisticated and analytical lesson design will most likely need to change in the course of an instruction and therefore they should be ready to modify and adjust it dynamically, according to students' reactions.

The first step for Differentiated instruction is to design the activities in a **Hierarchical order**, beginning with those which are used to test the prerequisite knowledge and then moving on to those that introduce the new knowledge. Furthermore, hierarchical activities refer to classifying activities that are simpler to more complex and that are more convergent to more divergent.

As shown in Diagram 3, the first two activities clearly require students to work and retrieve prior/ prerequisite knowledge before they are introduced to the new knowledge. Activities at the phase of instruction mostly include open ended activities, small investigations (Koutselini, 2008), brainstorming activities or entrance slips that require a minimum amount of time and can easily be assessed by the educator.



**Diagram 3: The heartbeat of differentiated Instruction** (Valiandes & Neophytou, 2017b)

By placing emphasis on the prerequisite knowledge, the teacher, through systematic formative assessment, provides students whose performance is below average, the opportunity



to work on their own pace with or without help (yet using learning braces), while at the same time provides to the more advanced students opportunities to move on and use this knowledge in more complex problems. Teachers who are quite new in the implementation of DI, often state that this process is too time-consuming, especially in the beginning, as there is a lot of prerequisite knowledge that has to be acquired by students. Extra time has to be spent on either re-teaching or correcting any misunderstandings students may have. After a while, students acquire the basic knowledge and can thus work more effectively on acquiring any new knowledge. This denotes that, teachers should patiently design and help construct this new knowledge rather than simply teach what it is stated within the curriculum, as the acquisition of new knowledge should be fundamentally based on prior knowledge.

Furthermore, designing instruction in a hierarchical way enables the teacher to adjust dynamically the activities and the time students need to work on specific activities, by observing students' work while the learning process is evolving. In practice, this means that students have the opportunity to work according to their own working and learning pace and thus do not have to follow the pace of the "mainstream" class. Although all students may begin the lesson from the same activity, later on each student works at his/her own pace, while the teacher oversees, supports and coordinates all the work done in the classroom.

Another main characteristic of differentiated instruction refers to the classification of an activity in terms of its complexity and the sophistication of the work needed. Classification of activities can be established in terms of the knowledge/skill students are expected to learn. Therefore, all students should be able to implement their analysis and composition skills, yet some will do that on a simpler level and others on a more advanced (Neophytou & Valiandes, 2015; Valiandes, 2013). When we refer to the classification of activities, we basically refer to the '**Horizontal Differentiation**' that allows all students to work on the acquisition of the same knowledge/skill through activities that are classified or leveled based on their difficulty, composition and complexity. Most of the times, these classified activities comprise of the same activity that is either more simplified and less demanding for weaker students or more challenging and complex for more advanced students. These activities are also referred to as **tiered activities**.

It should be made clear that no student should be excluded from accessing the more complex activities. On the contrary, based on the continuous observation and evaluation of students' work, teachers must dynamically adjust the activities so as to be in accordance with the students' readiness levels at any given time. As a student's performance improves, he/she can receive more challenging assignments, whereas if a student who was believed to be more advanced appears to be behind in terms of certain basic skills, the teacher should be ready to help him/her by assigning the proper, even simpler learning tasks (Neophytou & Valiandes, 2015). Differentiation is therefore a dynamic process that is based on flexible planning (Orlich, Harder, Callahan, Trevisan, & Brown, 2012; Tomlinson, 2001).

Activities that ensure students' better understanding and help them practice what they have been taught, or even transform their knowledge at a whole new level, should be included in the planning of teaching. These activities should be introduced during teaching in the form of **anchoring activities**. The purpose of these activities is to maximize students' participation in the activities which have a true learning value and meaning.

Moreover, the teacher provides the means and the material that students will need, as well as manages which student will have access to which material or mean, so as not to lose

any valuable teaching time or disrupt the flow of the lesson. Students need to become familiar with work **routines** and use the material that is available in the classroom. It is essential for students to establish the work routine individually, with their peers or in groups, as well as with the whole classroom (Diagram 3). Also, students should be able to use the various means that are available to support their learning style. Some of these essential routines are: writing in notebooks, using computer software, select and use the appropriate learning support, functional use of teaching aids, maths equipment etc.

**Learning support** has an important role in the implementation of differentiation. Learning braces can help students retrieve the essential prerequisite and fundamental knowledge as well as help them acquire new knowledge. It is important for the teacher to be aware when students might need additional support. The teacher may not be able to assist them at the given time, but they could use the **learning braces** (which could take up different forms e.g. bookmarks, visual aids, notebooks etc) that will enable students to work on their own, without constantly needing the teacher's help. The teacher, therefore, has more time to help and support those who actually need help, thus maximizing the time for individualized teaching and learning (Neophytou & Valiandes, 2015; Valiandes & Neophytou, 2017b).

Differentiation cannot be seen in the absence of assessment. Assessment is vital and essential for the planning, reflection and redesign of differentiated instruction. Consequently, further from pre-assessment, it is important to plan and design both formative assessment and final assessment. Through formative assessment the teacher gains information regarding the students' level of work, difficulties they may encounter, any misconceptions they might have and an overall idea on their progress, that allows teachers to dynamically adapt instruction.

Planning for differentiation of instruction can be concluded with the provision of final assessment, not as a way to test and compare students between their peers, but as a way to assess the level of knowledge and skills students have mastered. Final assessment may be in the form of exit slips, which constitute a quick and informal assessment technique. Information gathered by final assessment will support teachers' reflection regarding their instruction and simultaneously provide the basis for designing the next differentiated instruction.

### 3. Strategies and techniques of differentiated instruction

There are many strategies and techniques that teachers, all around the world, employ in their effort to implement differentiated instruction (DI) (Gregory & Chapman, 2007; Hall, Strangman, & Meyer 2002; Tomlinson, 1995, 2000, 2001; Valiandes & Neophytou, 2017b). Presented here, in short descriptions and examples, are some of most the popular and functional strategies and techniques of DI that can be used in mixed ability classrooms. It must be noted that instructional strategies tend to support the dynamic adaptation of instruction according to student's needs, since they do not constitute a close-end way for DI.

The following strategies for DI will be presented first,

1. Hierarchical lesson structure - hierarchical lesson activities
2. Asynchronous working and learning
3. Students working routine for DI
4. Tiered Activities
5. Anchor Activities
6. Flexible grouping
7. Curriculum compacting



Followed by these DI techniques:

1. Exit and Entrance slips
2. Learning Braces
3. Raft
4. Tic-tac-Toe

Many more strategies and techniques can be found in the extensive literature that is available. Once teachers are familiar and comfortable with differentiated instruction they can also develop their own strategies and techniques.

### 3.1. Strategies for Differentiation of Instruction

#### 3.1.1. Hierarchical lesson structure and hierarchical lesson activities

The **Hierarchical lesson structure** constitutes the basis upon which a differentiated lesson is designed, developed and implemented (Valiandes, 2013). Despite its importance, it is one of the easiest and most functional strategies for effective differentiated instruction. As the design of differentiated instruction is based on the theory of constructivism, it is essential that (further from identifying prerequisite, basic-core and transformative knowledge) all lesson activities should be structured in a hierarchical order. The hierarchical order of activities is a systematic and gradual transition from what is known to what is new. In this manner, students take small and steady steps that enable them to utilize their prior knowledge for the acquisition of the new, basic and transformational knowledge (Neophytou & Valiandes, 2015; Valiandes, 2013). The activities within such instructional planning are prioritized from what is known to what is unknown, from more simple to more complex ones and from those demanding lower cognitive skills to those demanding higher cognitive skill activities.

The teacher, according to the lesson aim and objectives, prioritizes the activities starting from activities that focus on the reflection, restoration, monitoring and evaluation of the prerequisite knowledge and skills. Then, the teacher provides students with activities that focus on the new knowledge, starting from simple to more complex ones. Within a hierarchical lesson structure, all students can work to their fullest extent by focusing on achieving the lesson objectives according to their level of readiness.

It is important to point out that not all students are expected to work on all of the activities, nor conquer the transformational knowledge provisioned for high achieving students. In addition, teachers must have in mind that not all students are expected to master the basic knowledge in the same depth and equal degree of understanding. Nevertheless, all students are expected to have opportunities to actively engage in the learning process so that it will enable them to move further, depending on their own personal entry point.

Designing a lesson based on a Hierarchal lesson structure provides students with the opportunity to work on activities that allow them to move in small steps, from one level to another and work and in their own pace. Thus, **hierarchal lesson structure is inextricably linked with asynchronous learning activities** (Neophytou & Valiandes, 2015; Valiandes, 2013). The main advantage of asynchronous activities is that they promote independent and personalized learning which maximizes time on task.

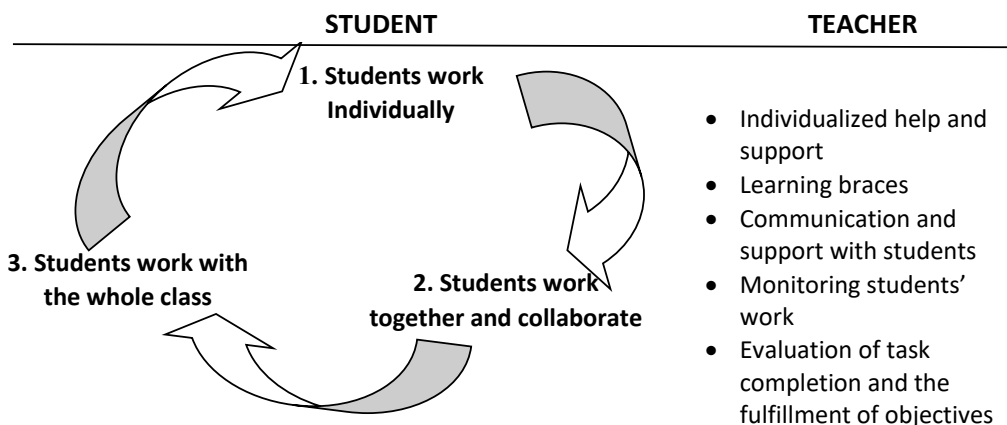
#### 3.1.2. Asynchronous working and learning

Asynchronous work signifies a process within a multitasking system whose execution can proceed independently (Neophytou & Valiandes, 2015; Valiandes, 2013). In a class-

room, this refers to the provision that each and every student can work in his/her own pace without being dragged up or pushed down, just to fit in an inflexible predefined timetable and framework of activities. As students work and learn on their own pace, teachers must design and implement the lesson plans that provide opportunities for individual work that fosters the development of a personal comfort zone for learning. According to a hierarchically structured lesson plan, students can work individually and move on to the next activity in an asynchronous manner, thus differentiating from their classmates. By establishing asynchronous work, low achievers and slow learners have more time to work and acquire the basic knowledge and skills, whereas high achievers and quick learners can move on, develop and enhance their learning and skills further more. In this way all students' needs are met and students feel happy working on activities that are meaningful and challenging. It is safe to say that differentiated instruction enables students to work individually in an asynchronous manner and learn on their own pace as part of their basic working routine. This individual work is then followed by cooperative work and the participation of the whole classroom.

### 3.1.3. Students' working routine for constructing knowledge in differentiated instruction

Each student has their own starting point and thus teachers must provide all students with opportunities to recall any previously acquired knowledge on a given instructional unit. In this way, students can start working from their own personal starting point and the teacher can identify any misconceptions they may have or lack of necessary prerequisite knowledge. While students work individually, the teacher supports their work accordingly, thus allowing them time to work and learn individually. Upon the teacher's signal, students start to work in pairs or in groups to exchange ideas regarding their work. Within the group, students can interact both with their peers and the teacher, revise and enrich their work and when they are ready present it to the class (*Diagram 4*). This routine provides students with authentic learning situations that allow deep, profound and sustainable learning for all (Valiandes, 2013).



**Diagram 4: Students' work and learning routine in classroom** (Valiandes, 2013)

### 3.1.4. Tiered activities

Tiered activities are identified as planning strategies that can be used in a mixed ability classroom. Tiered instruction focuses on the teaching of a concept and meeting the different learning needs within a group. Tasks and/or resources may vary according to students' learning profile, readiness levels and interests. The use of tiered activities maximizes the likelihood that each student comes away with the understanding of key skills and that each student is appropriately challenged.

#### Phases of implementation

- Develop the on-level task, according to the standards expected by the curriculum.
- Adjust the task to create a below-level task for struggling students.
- Adjust the task to create an above-level task for advanced students.

#### Classroom techniques

##### For Struggling Students

- Level: Provide more accessible readings/materials (level, vocabulary, form, etc.) on the same topic; use recorded readings.
- Structure: Provide highlighted texts; utilize graphic organizers to direct reading and problem solving.
- Complexity: Simplify the complexity of an assignment by providing aids (guidelines, learning braces, etc.) that will guide them through the various steps that are necessary to reach the minimum goal set for all students in the class.

##### For advanced students

- Level: Provide more expert-like readings/materials (level, vocabulary, form, etc.) on same topic.
- Pace: Ask students to examine the view of the author/innovator-information or a similar piece/problem and to look for connections/patterns.
- Creativity: Provide more open-ended assignments—give students room to experiment with various options about reaching a well specified goal (same goal as the rest of the class).
- Complexity: Increase the complexity level of an assignment.

Examples and ideas for activities and possible products regarding the 3 tiers are presented in Table 1.

**Table 1: Examples and ideas for tiered activities**

Tiers	Questioning Cues	Possible products
<b>Tier 1 activities</b>	Describe, name, define, label, select, identify, write, describe, memorize, recite, list, draw, match, illustrate, explain, compare, paraphrase, defend, predict, restate, summarize	Dictionary, diagram, collage, television show, newspaper, speech, graph, story, radio program, outline

<b>Tier 2 activities</b>	Classify, collect, produce, solve, model, apply, examine, survey, distinguish between, categorize, select, interpret, infer, separate, investigate	Survey, questionnaire, report, model, an idea broken into parts, mobile, painting, puzzle, diagram, map, illustration, forecast, project, sculpture, solution
<b>Tier 3 activities</b>	Invent, judge, evaluate, give opinion, hypothesize, imagine, prioritize, critique, what if, recommend, plan, weigh, assess, compose, develop, role-play, create, summarize	Set of rules, an alternate course of action, invention, detailed report, poem, experiment, cartoon, game, trial, self-evaluation, debate or group discussion, a hypothesis formulated and tested

**Example 1: Language lesson - Completing a Character Map (Heacox, 2002)**

Tier 1. (Low)	Describe: - What the character looks like - What the character says - How the character thinks or acts - The most important thing to know about the character
Tier 2. (Middle)	Describe: - What the character says or does - What the character really means to say or do - What goals does the character have - What the character would mostly like us to know about him or her - What changes the character went through
Tier 3. (High)	Describe: - Clues the author gives us about the character - Why the author gives these clues - The author's bottom line about this character

**Example 2: Math's tiered activity example**

Division and multiplication in problem solving: Exploring the relation between division and multiplication in solving problems

Tier 1. (Low)	A. Solve the following equations $4 \times 8 =$ $32 : 4 =$ B. Which of the 2 equations can I use to solve the following problem? Explain. Anna has 32 books she wants to put equal numbers of books on her 4 bookshelves. How many books must she place on each shelf?
Tier 2. (Middle)	A. Solve the problem Anna has 32 books that she must place in equal numbers on her 4 bookshelves. How many books must she place on each shelf? B. Write your own problem in which the question should be 'How many roses are there in each vase?'

Tier 3. (High)	<p>A. Solve the problem in two different ways. Anna has 32 books that she must place in equal numbers on her 4 bookshelves. How many books must she place on each shelf?</p> <p>B. Now write your own problem that can be solved in the same way.</p> <p>C. Write down your thoughts regarding the relation between multiplication and division as you have witnessed it in the above problems.</p>
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### Example 3: Tiering by outcome in maths

All students use the same materials, but what they do with the materials is different.

Example: Pattern block Math

Tier 1. (Low)	Identify all the ways you can group your pattern blocks.
Tier 2. (Middle)	Identify all the different patterns you can make with your pattern blocks.
Tier 3. (High)	Create a bar graph to show all the different kinds of pattern blocks in your bag.

### Example 4: Language lesson tiered activity

Writing a Persuasive Essay for 4th–6th Grade Classroom (Heacox, 2002)

	Beginning	Intermediate	Advanced
<b>Outcome/ Objective</b>	Students will decide on a topic and will write a five-sentence paragraph with a main idea, three supporting sentences, and a concluding sentence.	Students will decide on a topic, state a point of view, and write two paragraphs defending that point of view.	Students will decide on a topic, state a point of view, and write an essay of at least five paragraphs where multiple sources will be used to defend that point of view.
<b>Instruction/ Activity</b>	Students will receive an example of a five-sentence paragraph and explicit instructions on how to construct the paragraph. As part of a prewriting activity, students will list their topic and develop a list of at least three things that support their topic.	Students will receive an example of a persuasive essay and a graphic organizer that explains the construction of a persuasive essay. Students will also receive explicit instructions on how to write a persuasive essay. As part of a prewriting activity, students will have to use the graphic organizer to plan their writing.	Students will review the graphic organizer for a persuasive essay. Students will be given explicit instructions on how to locate different sources and quotes to use in their essays. As part of a prewriting activity, students will use the graphic organizer to organize their essay. Students will also compile a list of five sources that will help them defend their main point.

Assessment	Students will be able to write a five-sentence paragraph that successfully states and supports a main idea. The paragraph will meet the criteria on the state writing rubric.	Students will be able to state a point of view and successfully defend their ideas by using two paragraphs that defend their point of view, main ideas and supporting material. The paragraphs will meet the criteria on the state writing rubric.	Students will be able to write a five-paragraph essay that states a point of view, defends the point of view, and uses resources to support the point of view. The essay will meet the criteria on the state writing rubric.
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### 3.1.5. Anchor activities

Anchor activities (Perry, 2012; Tomlinson & Strickland, 2005; Valiandes & Neophytou, 2017b) are activities that are designed prior to the lesson for students to work on immediately after finishing certain specific tasks during class time or after their class work has been completed, so as to maximize the instructional time. These activities are intended to review, practice or extend learning with regards to the instructional objectives. They must never be seen or used as activities to keep students busy during class by having them do extra work without any real learning gain. Activities may be designed for students to be completed independently or in small groups. Students may be assigned some particular tasks or may choose from a number of tasks provided by the teacher. All tasks should be relevant to the concepts being developed in class, but some may be more complex or demand higher thinking skills than others. The purpose of the anchor activities is to provide meaningful work to students when they finish an assignment or a project. They provide ongoing tasks that are linked to the content (standards) and the overall instructional framework. Anchor activities also develop independent group work strategies in students, which allow the classroom teacher to work with other groups of students or individuals.

### Phases of implementation

1. Create Activities: To begin, you must first create some specific activities or a set of activities that coincide with the targeted content area and which can be used in particular phases of the lesson. Activities may vary for different skill levels, as well as interests.
2. Introduce Activities: Once these activities have been created, introduce the idea of anchor activities to students. Describe your expectations, the tasks and the time students will have to work on the activities.
3. Assessment: Assessment of the activities can be done both during class and through student-teacher conferences, rubrics, and student contracts.

### Classroom techniques

- Used in any subject
- Individual assignments or small groups

- Tiered to meet the needs of different readiness levels
- Interdisciplinary for use across content areas or teams

#### **Examples for anchor activities for science:**

- Write a letter to a member of the government about an environmental issue we've talked about in class.
- Write a letter to a famous scientist or person who has contributed to science. Be sure to include questions you'd really like this person to answer for you.
- Come up with a list of new "essential questions" you'd like to have answers to about our unit of study (or future units).
- Create a perfect "habitat" for an animal of your choice. Use any format you'd like to illustrate your habitat.
- Write an experiment you could conduct to teach others about a science concept you've learned in class.
- Create a mind map/web using a school approved App or Extension on the computer to illustrate a science concept to share with others.
- Research an important event or invention in Science. Find out what was going on during the time that this event occurred in the rest of the world. Are there any relations/connections/effects between these events?
- Make a list of what you think are the top ten environmental issues in today's world. Be sure to put them in order of importance.

#### **3.1.6. Flexible grouping**

Flexible grouping (Ford, 2005; Radencich & McKay, 1995) is a strategy that groups students together in a more flexible way. This can be realized by grouping the whole class together, by creating a small group in the class, or group students with a partner. Flexible grouping creates temporary groups that can last for an hour or a week. Groups may differ from one learning subject to another or from a lesson to another as groups are created based on different criteria according to the specific lesson, the activities and the student needs. In this sense, groups are not permanent and flexible grouping is a temporary way for students to work together in a variety of ways and formations. In order to successfully differentiate instruction through flexible grouping, teachers must consider the students' learning profiles, their interests, their social and collaborative skills and their readiness levels. To promote maximum learning and establish a sense of collaboration within different groups, students need to frequently change groups depending on their specific needs.

#### **Phases of implementation**

1. Ask yourself, "What is the best group formation to meet the learning outcome for this activity?" Consider a teacher-led group (whole-class, small group, or an individual teacher-directed activity), or a student-led group (collaborative, performance-based, or pairs).
2. Evaluate all assessment data and look over student-learning profiles to help you form groups.



3. Identify the most effective group formation. For example, group students based on their gender, previous group, student's selection, or teacher's selection.
4. Identify the most effective grouping formation. For example, group students by gender, previous group, student selection, or teacher selection.

### **Classroom techniques**

- Create a color-coded system or chart to help you (and students) know which group(s) they are in.
- Give specific instructions about the tasks groups must perform.
- Write on the classroom board some specific instructions and expectations so that you don't have to repeat yourself.
- Model and practice routines and procedures for getting into and out of groups. Develop a routine so as not to leave your classroom in "utter chaos" after a group task is completed.
- Set a specific time limit for students to complete their group work. It's best to set an alarm so students know when the alarm goes off, they must proceed to the next activity quietly.
- Implement a student learning log for each group they are in. A color-coded one works best for students to keep track and record what they completed in each group.

### **3.1.7. Curriculum compacting**

This teaching strategy is designed to adapt the curriculum to the needs of highly gifted students or those who demonstrate particular strengths in certain areas or topics within the curriculum. This approach renders the curriculum more flexible and provides a process with which the students may substitute content they have already fully assimilated, with content they find more challenging and motivating. Students spend some time with the grade level content, and some time with the more challenging content. This way all students are challenged, continue to learn important information and skills, and are able to progress at school (Reis, Burns, & Renzulli, 1992). To apply compacting in the classroom, the objectives of a particular unit or learning point must first be defined. Next, the competencies, skills or content that the student has already mastered, should be identified. Finally, these elements are substituted with new scenarios or experiences that can provide the student with opportunities to make more productive and enriching use of their time within the educational setting.

### **Phases of implementation**

1. Identify the aims and objectives of a given area or course.
2. Include students in the evaluation process.
3. Assess students' competence in a specific area.
4. Propose alternatives that these students will find more challenging.
5. Prepare an Individual educational programming guide that includes:
  - CURRICULUM AREAS TO BE CONSIDERED FOR COMPACTING: Provide a brief description of the basic material to be covered during this marking period and the assessment information or evidence that suggests the need for compacting.
  - PROCEDURES FOR COMPACTING BASIC MATERIAL: Describe the activities that will be used to guarantee proficiency in basic curricular areas.
  - ACCELERATION AND/OR ENRICHMENT ACTIVITIES: Describe the activities that



will be used to provide advanced level learning experiences in each area of the regular curriculum.

### Classroom techniques

- Peer tutoring (as an alternative the student may tutor other students in the class-room)
- Cooperative learning
- Autonomous working (alone or with a partner), researching and proposing solutions to a problem related to the content being studied (participation in activities that serve the community).
- Provide students with assessment guidelines (rubric) to enable them to grade their learning progress throughout a given unit.

### Examples of curriculum compacting

Curriculum areas to be considered for compacting	Procedures for compacting basic material	Acceleration and/or enrichment activities
Maths	<u>Addition of fractions</u> as part of a whole surface for all students – addition of fractions as part of a quantity (compacting).	Students solve math problems with addition based on a quantity (i.e. $\frac{3}{4}$ of 40).
Language	<u>Vocabulary</u> Dictation and use of more advanced and difficult words on the same subject.	Students find words from the dictionary and other resources and use them in their assignments in terms of the subject of the unit.

## 3.2. Techniques for Differentiation of instruction

### 3.2.1. Exit and Entrance Slips

Exit and Entrance Slips (Fisher & Frey, 2004; Greenstein, 2010) constitute an informal and quick way for a non-formal assessment that allows formative assessment to guide the lesson process. Through exit or entrance slips teachers can have an overall picture of their students' readiness level, knowledge and abilities in a particular area. Information provided by the slips will support teachers' instructional decisions towards an effective differentiated instruction (Valiandes & Neophytou, 2017b). Both the entrance and exit slips may be in the form of close or open ended questions/ activities depending on its purpose and the subject area that needs to be assessed.

**Entrance slips** help students reflect on what they know by working and recalling the pre-requisite knowledge needed to work and help them acquire the new knowledge. Entrance slips are very useful to identify any students' misconceptions or difficulties they might have in terms of the prerequisite knowledge. This information will allow the teacher to adapt one's instruction in order to necessary correct any misconceptions and provide students with opportunities to work and learn the prerequisite knowledge. Of course this is not always the case

since not all students are able to acquire this knowledge within such a small time span. In this case, the learning braces must be used to help students work and learn.

### Create and use of entrance slips

- After determining the prerequisite knowledge, think of activities that will help student recall this knowledge.
- Create an entrance slip that you can present to students orally, illustrate it visually, or present it in printed form.
- Soon after students quiet down introduce the lesson by handing out the entrance slip that they should all work on for 2-4 minutes.
- Students may write their responses in their notebook, on a post-it note, on a blank piece of paper or on a handout provided by the teacher.
- Students who complete their work on the entrance slip can check their work with the students sitting next to them or their group.
- The teacher reviews student's work and gathers information regarding their level of knowledge and understanding on the specific topic.
- Entrance slips are not usually collected by the teacher but one might do so in cases that the teacher wants to study them in order to get more information about students' individual work.

#### Example 1: Elementary History lesson entrance slip (Valiandes & Neophytou, 2017b)

Lesson aim: Students should be able to identify and talk about the differences between the Paleolithic and Neolithic eras.

Prerequisite knowledge: Students should be able to identify and talk about the main characteristic of the Paleolithic era. The teacher will ask students to work on the entrance slip to evaluate their knowledge on this particular subject area.

#### Entrance slip

##### Choose and work on one of the following activities

1. Write down a few words (or sentences) that come in mind when you hear the phrase Paleolithic Era?
2. Draw a picture about the Paleolithic Era and prepare to talk about it in classroom.

#### Example 2: Elementary maths lesson entrance slip (Valiandes & Neophytou, 2017b)

Maths lesson: Area of shapes

#### What do you know about the shapes below?

1. Identify the shapes below by writing the name of each shape.



2. Write their main characteristics (angles, sides) of each shape.

**Exit Slips** help students reflect on what they have learned and the degree to which they can use this new knowledge and/ or skill. This information will guide the teacher to design the following lesson on the topic by having in mind what has already been learned and what has to be reviewed or revisited in order to resolve any misconceptions. Exit Slips are great to use because they take just a few minutes to be prepared by the teacher and students can complete them very quickly.

**Generalized categories and examples of exit slips** (Fisher & Frey, 2004):

- Prompts that document **learning**,
  - Write one thing you have learned today.
  - Discuss how today's lesson could be used in the real world.
- Prompts that emphasize the **process of learning**,
  - I didn't understand...
  - Write one question you have about today's lesson.
- Prompts to evaluate the **effectiveness of instruction**
  - Did you enjoy working in small groups today?

**Create and use of exit slips**

- At the end of your lesson, or five minutes before the end of class, ask students to complete the exit slip.
- Instructions on how to complete the "exit slip" can be provided orally, through visual representations, or in printed form.
- Students may write their responses in their note-book, on a post-it, on a plain piece of paper or on a printed form provided by the teacher.
- Students should turn in their exit slips as they leave the classroom.
- The teacher reviews the exit slips and determines how to best design one's next lesson to meet the needs of all students.
- Collect the exit slips as a part of an assessment portfolio for each student.

**Example 1: EXIT SLIP for English lesson.**

*Objective: Assessment of students' ability to use comparatives*

**Write sentences to compare the vehicles you can see in the pictures.**




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Name \_\_\_\_\_ Class \_\_\_\_\_

**Example 2 : EXIT SLIP 3, 2, 1-**

A more general form of exit slip that can be adjusted accordingly

<b>3 , 2 ,1 EXIT CARD</b>	
<b>Name :</b> .....	<b>Date:</b> .....
<b>Write down.....</b>	
<b>3 things you have learned today and how you will use them</b>	
3 _____	
2 _____	
1 _____	
<b>2 things you want to learn more about</b>	
2 _____	
1 _____	
<b>1 thing you found difficult or didn't like</b>	
1. _____	

**3.2.2. Learning Braces**

Learning braces, as evidenced by their name, enhance understanding, motivate and help students work and thus promote learning (Valiandes & Neophytou, 2017b). One might say that a learning brace is a lot like a “helping cane” for someone who finds it difficult to walk. Students very often, despite being taught and having learned a certain concept, knowledge or developed a specific skill, have difficulties recalling or using their “preexisting” knowledge or skill. This is why it is important for teachers to provide students with opportunities to recall and work on the prerequisite knowledge, in an effort to evaluate their understanding, the degree of mastering a skill or any misconceptions that may exist regarding this knowledge of skill. The results of this initial informal evaluation helps teachers assess whether students have indeed acquired the prior knowledge and thus act accordingly, by providing the appropriate learning brace that will support students in the construction of new knowledge or the development of new skills.

A learning brace is identified as something that can support students’ cognitive process and reduce the load of his/her work. It is important to make sure that any learning brace we provide the students with is easy to understand and use. A functional brace is a useful tool that the student can refer to when working on a specific task e.g. a bookmark, a table of formulas, a poster. Students often need to use a brace again and again until they master the intended knowledge.

**Examples:**

- Multiplication tables can be used as a learning brace for the teaching of division.
- A cardboard with adverbs can be used to support story telling.
- A list of adjectives can be used to support creative writing.

**3.2.3. RAFT (ROLE, AUDIENCE, FORMAT, TOPIC)**

RAFT is a writing strategy that helps students understand their roles as writers, the targeted audience, the varied writing formats, and the topic they’ll be writing about (Tomlinson, 2003; Valiandes & Neophytou 2017b). By using this strategy, teachers encourage

students to write creatively, to consider a topic from a different perspective and to practice writing for different audiences. It includes writing from different viewpoints. It helps students learn important writing skills such as writing for a specific audience, expressing the main idea, and organization. It teaches students to think creatively about writing by responding to the following questions:

**Role of the Writer:** Who are you as a writer? (a president, a toy, a particular character) What is your role in the story? How would this role affect your writing?

**Audience:** To whom are you writing? (a schoolmate, a teacher, readers of a newspaper) What is the appropriate language to use when addressing this particular audience?

**Format:** What is the format of your writing? (a letter, a poem, a speech)

**Topic and strong verb:** What are you writing about? Why? What's the subject or the main point?

### Phases of implementation

1. Identify the learning goals of the lesson/unit.
2. Use the assessment data and students' profiles to determine students' readiness levels, learning styles, or interests.
3. Design different writing tasks by determining the role of the writer, the audience, the format and the topic of the text.
4. Arrange the tasks on a RAFT choice board.
5. Check the following:
  - Does the RAFT appeal to different learning styles?
  - Is there a range of difficulty in the roles, formats, readiness levels?
  - Do the roles, formats or topics appeal to a variety of students' interests?

### Classroom techniques

RAFT is a strategy that employs multiple ways for meeting the needs of all students, based on where they are and their identified needs. Possible Ideas for a RAFT:

characters from a story, historical figures, jobs, key terms, scientists or politicians, musical instruments, diseases, geographic formations, vocabulary words, cartoon characters, types of fabric, composers or artists, instruments or tools, shapes or colours, authors or inventors, business or industry person, minerals or chemical elements, cities, countries or continents, technical terms, etc. It can also be used during a maths lesson.

### Example of RAFT during a foreign language food lesson

Role	Audience	Format	Topic
Chef	Customer	Menu	Detailed description of all the ingredients
Cookbook writer	Cooks	Recipe	Instructions on food preparation
Customer	Restaurant owner	Complain	Problem with food or poor service
Student visiting a foreign country	Parents	Letter	Describing a typical meal you eat in the foreign country you are visiting
Travel writer	Reader wanting to travel	Recommendation	Good things to eat while in this particular foreign country and what to avoid

### 3.2.4. Tic-tac-toe

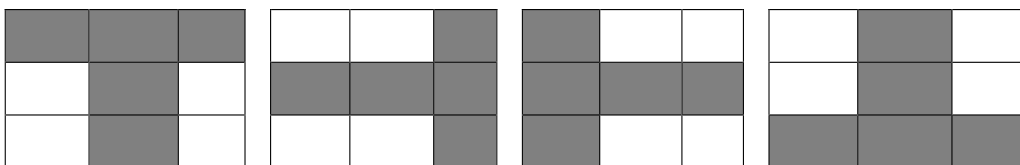
Tic-tac-toe, also known as Think-tac-toe, is a differentiation tool that offers a collection of activities from which students can choose to demonstrate their understanding on a topic (Nunley, 2006; Valiandes & Neophytou, 2017b). It is presented in the form of a nine-square grid similar to a tic-tac-toe board and students may be expected to complete until they get “three in a row”. The activities vary in terms of content, process, and product and can be tailored to address different levels of student readiness, interests, and learning styles. The central square may be left blank for students to select an activity of their own. Tic-tac-toe activities may be given to every student in the class, higher ability students as enrichment activities or below average performing students as review and practice activities. Involvement in this strategy encourages independent learning. Teachers should periodically monitor students and ask them to keep a log of their progress. In cases of lengthy activities, the tic-tac-toe board may also be used with shorter, open-ended questions posed at varying levels of Blooms Taxonomy.

#### Phases of implementation

1. Identify the outcomes and instructional focus of a unit of study.
2. Use the assessment data and students’ profiles to determine students’ readiness levels, learning styles, or interests.
3. Design nine different tasks based on knowledge/skills that students should work and be assessed on.
4. Arrange the tasks on a choice board by placing in the central square of the board the task that all students should complete.
5. Students then choose and complete three tasks, one of which must be the task in the middle square. The three tasks should complete a Tic-Tac-Toe row.
6. Students who complete one Tic-Tac-Toe row may carry on and try to complete more activities and more Tic-Tac-Toes.

#### Classroom techniques

- Allow students to complete any three tasks—even if the completed tasks don’t complete a Tic-Tac-Toe row.
- Create different choice boards based on students’ readiness level. (Struggling students work with the options on one choice board while more advanced students have different options.)
- Create different choice boards based on students’ learning styles or learning preferences. For example, a choice board could include three kinaesthetic tasks, three auditory tasks or three visual tasks.
- Create a choice board with more than 9 options (e.g. 16)
- Instead of having students complete a tic-tac-toe row, give them a board template so that they design/colour a certain pattern inside the 3x3 square e. g.:



**Example 1: Tic-Tac-Toe Choice Board for a Book Report**

Draw a picture of the main character.	Perform a play that shows the conclusion of a story.	Write a song about one of the main events.
Write a poem about two main events in the story.	Make a poster that shows the order of events in the story.	Dress up as your favourite character and perform a speech telling who you are.
Create a Venn diagram where you can compare and contrast the introduction to closing.	Write two paragraphs about the main character.	Write two paragraphs about the setting of the story.

**Example 2: Maths Tic – Tac – Toe**

Place the numbers in the circles in ascending order, from the smallest to the greatest.  23    56    47    29    63    18	<u>Write the number which has:</u> 5 tens και 3 units → ..... 1 ten και 9 units → ..... 4 tens και 5 units → ..... 9 tens → .....	<u>Write the number before and after the given number</u> ....., 56, .....    ..... , 77, ..... ....., 18, .....    ..... , 40, ..... ....., 29, .....    ..... , 31, ..... ....., 50, .....    ..... , 99, .....
Write the number Seventeen: ..... Twenty-five: ..... Ninety-nine: ..... Thirty: .....	Find the answer $6 \div 2 =$ $20 \div 2 =$ $4 \div 2 =$  $10 \div 2 =$ $16 \div 2 =$ $14 \div 2 =$  $12 \div 2 =$ $2 \div 2 =$ $18 \div 2 =$	Draw the beads on the abacus:  <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>Tens    Ones</p> <p>37</p> </div> <div style="text-align: center;"> <p>Tens    Ones</p> <p>64</p> </div> </div>
Solve the problem A bus can carry more than 43 passengers and less than 56. If the units' digit is 7. How many passengers can the bus carry;  Answer : _____	Fill in: <p>_____ tens and _____ units</p> <p>_____ tens and _____ units</p>	Pair the objects. Write the equation for each representation.  <p>*****</p>

## 4. Lesson plan based on differentiated instruction philosophy

The present chapter provides an example of a lesson plan for the instruction of division in the 4<sup>th</sup> grade of the elementary school. This example is based on the Cypriot curriculum and therefore reflects the content of the textbooks used in the Republic of Cyprus. Nevertheless, since mathematics can be considered as the “lingua franca”, we are confident that this lesson plan will provide useful insights and good examples that any teacher, no matter where he/she might be from, will be able to use.

The structure of the lesson plan as well as its overall design, reflects the rational proposed throughout this book. Planning begins with the establishment of the prerequisite, basic and transformational knowledge and skills (see Chapter 2), all of which are utilized during instruction, to maximize active, on task engagement of all students in the learning process.

Further, via the application of various techniques and strategies of differentiated instruction (see Chapter 3), this lesson plan, sets a framework that aspires to enable students of different readiness levels and aptitude to accomplish the same objectives, yet while working at differentiated tasks per their needs, learning profile and pace.

### 4.1. Maths Lesson plan based on differentiated instruction philosophy and techniques

<b>Fourth Grade: Division - distributive property</b>
<b><u>Prerequisite Knowledge</u></b> Children should be able to: <ul style="list-style-type: none"> <li>• Apply the distributive property of multiplication.</li> <li>• Perform multiplication and division as inverse operations.</li> </ul>
<b><u>Objectives:</u></b> Children will be able to: <ul style="list-style-type: none"> <li>• Perform divisions with a single digit divisor, using different strategies, materials and representations.</li> <li>• Solve problems of multiplicative structure.</li> <li>• Use the division algorithm.</li> </ul>
<b><u>Transformational knowledge and skills</u></b> Children will be able to: <ul style="list-style-type: none"> <li>• Write and solve their own division and multiplication problems.</li> <li>• Solve divisions in their head which include a three-digit number by a one digit number.</li> </ul>
<b><u>Evaluation</u></b> <ul style="list-style-type: none"> <li>• On-going, depending on the children’s response to oral and written assignments during the course</li> <li>• Entrance slip</li> <li>• Exit Slip</li> </ul>



### Lesson Procedure

- ❖ Starting point- Reestablishment of prior knowledge:  
All children are given an entrance slip so as to be able to take part in the mathematical journey that is about to begin. They must quickly solve as many mathematical equations ( $\times 10$ ,  $\times 100$ ,  $\times 1000$ ) and division as they can. The students first work individually and then compare their work with their peers and their group. The teacher is constantly moving around the classroom monitoring and providing support to students.

#### SOLVE THE EQUATIONS TO WIN A TICKET!

To ensure the ticket for your next mathematical journey, you must solve the following mathematical equations.

$$\begin{array}{ll} 5 \times 10 = \dots\dots\dots & 420 \div 70 = \dots\dots\dots \\ 5 \times 100 = \dots\dots\dots & 350 \div 50 = \dots\dots\dots \\ 6400 \div 80 = \dots\dots\dots & 484 \div 4 = \dots\dots\dots \\ 70 \times 80 = \dots\dots\dots & 49000 \div 700 = \dots\dots\dots \end{array}$$

- ❖ The students are then presented and urged to explore p. 108 of their textbook.



#### ΕΞΕΡΕΥΝΗΣΗ

Να χρησιμοποιήσεις λέξεις, σχέδιο ή μαθηματικά σύμβολα, για να εξηγήσεις πώς θα εκτελέσεις τη διαίρεση  $396 \div 3$ .

#### EXPLORATION:

Use words, a drawing or symbols to perform the division  $396 \div 3 = v$

- ❖ Students are asked to explain how they will perform the division  $396 \div 3 = \dots\dots\dots$ . Each student may use either their notebook or/and dienes cubes and/or their bookmark.

#### REMEMBER!

$\times$	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

$$3 \times 6 = 18$$

$$18 \div 3 = 6$$

$$18 \div 6 = 3$$

$$\begin{aligned} 6 \times 16 &= 6 \times (10 + 6) \\ &= (6 \times 10) + (6 \times 6) \\ &= 60 + 36 \\ &= 96 \end{aligned}$$

### Differentiation

#### Work Routine

Individual work-group-class entirety

#### Entrance Slip

Assesses students' prior knowledge and allows them to recall what they know.

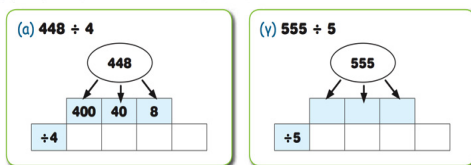
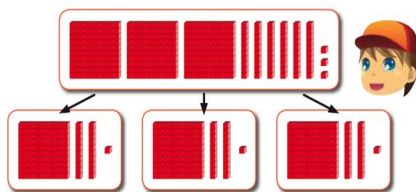
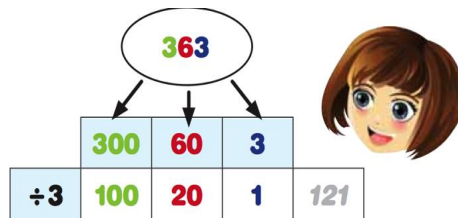
**Open activity** to motivate students and engage them in the learning process

**Learning braces:**  
notebook, dienes cubes, bookmark

Verbalization of thought

Individual /group work  
group/participation of  
the whole class

- ❖ More able students are urged to explain to the rest of the group how they should proceed with the problem, practice their metacognitive skills right from the beginning of the lesson.
- ❖ Children who are quick to solve the problem may:
  - Try and find other methods of solving the division
  - Compare the methods they used and decide on the best one as well as explaining why.
  - Write down or explain to the group the method they have used.
- ❖ The teacher provides assistance to anyone who needs it.
- ❖ The children work with Activity 1 on p. 109 as well as the thinking processes of Stephanos and Loukia in terms of how they carried out the division  $363 \div 3 = v$  (Pay attention to the possibility of students not being able to understand that we should start from left-right).



- ❖ Children are then asked to work with a differentiated version of the previous activity where the decades cannot be exactly divided. eg.  $412 \div 3 = v$  or  $189 \div 9 = v$ . Importance is given to the explanation of the thinking processes (new knowledge). Having individually calculated the quotient, they check to verify their answer with the student sitting next to them and explain their thinking process. Children can work on the following links in different levels:

### Anchor activity

*allows students to work according to their needs when other students are working to complete the class work.*

### Personalized support by the teacher

**Engaging students** on an individual basis depending on their abilities and working pace.

### Asynchronous work

Students work according to their pace without having to rigidly follow a mainstream pace set by the teacher.

Division by using Dienes:

[https://www-k6.thinkcentral.com/content/hsp/math/hspmath/na/common/itools\\_int\\_9780547584997/\\_basetenblocks.html](https://www-k6.thinkcentral.com/content/hsp/math/hspmath/na/common/itools_int_9780547584997/_basetenblocks.html)

Division by estimation the result and by using algorithm/Division by using algorithm: <https://www.matific.com/us/en-us/>

- Grade 4/Arithmetic Operations/Division and Place Value/ Somewhere Along the Line Estimate Division: Level I)
- Grade 4/Arithmetic Operations/Division and Place Value/Got to Split Divide 3-Digit Numbers)

- ❖ More able children may proceed with the activities 2 & 3. The detailed division algorithm is presented for the first time (p. 110). The divider analysis is performed (eg.  $484 \div 4 = v$  they take into account that  $400 \div 4 = 100$ ,  $80 \div 4 = 20$ ,  $4 \div 4 = 1$ , therefore  $100 + 20 + 1 = 121$ ).

'Glaros' company bought the office equipment that you can see on the receipt.

2. Η εταιρεία «Γλάρος» αγόρασε τον εξοπλισμό γραφείου που παρουσιάζεται στην απόδειξη πληρωμής.

Ο Γιάννης και η Αλεξία εργάστηκαν με διαφορετικό τρόπο, για υπολογίσουν το κόστος μιας καρέκλας γραφείου.

John and Alexia worked in a different way to find out the cost of a chair.

Find the cost of:

Ανός γραφείου  
Μιας βιβλιοθήκης  
Μιας συρταριέρας

An office  
A bookshelf  
A drawer

484 ÷ 4 = (400 + 80 + 4) ÷ 4  
= (400 ÷ 4) + (80 ÷ 4) + (4 ÷ 4)  
= 100 + 20 + 1  
= 121

Ε Δ Μ  
4 8 4 | 4  
1 2 1

RECEIPT

ITEM	QUANTITY	TOTAL
Office Chair	4	€484
Office	3	€693
Bookshelf	2	€426
Drawer	5	€505

ΑΠΟΔΕΙΞΗ ΠΛΗΡΩΜΗΣ

ΕΙΔΟΣ ΠΟΣΟΤΗΤΑ ΣΥΝΟΛΟ

Καρέκλα γραφείου 4 €484  
Γραφείο 3 €693  
Βιβλιοθήκη 2 €426  
Συρταριέρα 5 €505

Πlease explain the way that each child worked. What do you observe?

Use of technology to engage students in the learning process and provide opportunities for all students to work and learn according to their learning profile and working preferences

**Anchor activity** allows students to work according to their needs when other students are working to complete the class work.

Differentiated work - **Active involvement of all students** on an individual level, according to each child's pace.

- ❖ Children calculations are carried out in their notebook and/or some laminated calculator cards are used.

- ❖ Students are asked to solve, horizontally, vertically and diagonally, as many lines of the mathematical Tic-Tac-Toe. The only condition is to solve the center activity of the Tic-Tac-Toe, where the new knowledge to be acquired is placed.

**Time for TIC TAC TOE!**

Solve at least 3 exercises (vertically, diagonally, horizontally) to win!  
You must pass through the center!

Show, by means of dienes cube, how you will solve the division  $248 : 2 = \dots$

Katerina cut the 360 cm length ribbon she held into 6 equal pieces. What is the length of each piece?

i.  $360 + 6 = v$   
ii.  $360 \times 6 = v$   
iii.  $360 \div 6 = v$

$369 : 3 = \dots$

Three friends went to a restaurant to eat. They asked for the bill which turned out to be €99. They decided to equally share to the amount they had to pay. How many euros will each one have to pay?

Mathematical proposition: .....  
Answer: .....

Equation	Dividend	Divisor	Quotient
$936 : 3$			
$886 : 4$			
$639 : 3$			
$555 : 5$			

Write down a problem that fits the mathematical proposition  $826 : 2 = \dots$  and then solve it.

Calculate the quotient in any way you can.

$969 : 3 =$      $550 : 5 =$      $66 : 6 =$   
 $93 : 3 =$      $844 : 4 =$      $55 : 5 =$   
 $808 : 4 =$      $426 : 2 =$      $189 : 9 =$

The 248 students of a school were divided into groups of two. How many groups were formed?

Equation: .....  
Answer: .....

Mary will refurbish her house living room for €4200. She will pay the amount in 7 equal installments. How much money will she give for each installment?

i.  $4200 : 7 = v$   
ii.  $4200 + 7 = v$   
iii.  $4200 \div 7 = v$

**Tic – tac – toe** used as an **Exit Slip** so that student will work on activities they choose to show what they have learned

**Tic-tac- toe** allows students' asynchronous work

**Transformational Activities /Extension Activities /Enrichment Activities that can be use if there is time or may be provided for home work.**

- Write down and solve some division problems by themselves.
- Answer questions, through performing in their heads division calculations pertaining to three digit numbers divided by a one digit number, through mentally analysing the divider.
- Solve problems using the new knowledge
- Examples from the book Ex. 2 and 3, pp. 126-127

2. Να συμπληρώσεις και να γράψεις τη μαθηματική πρόταση.

(a)

Please complete and write the equation.

3. Ο Αντρέας χρησιμοποίησε τον πιο κάτω τρόπο για να βρει το πηλίκο της διαίρεσης  $842 : 2$ .

Andreas used the following way to solve the equation  $842 : 2 = v$

Να βρεις το πηλίκο των διαίρεσεων, χρησιμοποιώντας τον τρόπο σκέψης του Αντρέα.

(a)  $96 : 3 =$

(b)  $268 : 2 =$

Solve the following equations, using

Asynchronous work of student in this lesson may provide extra time for students to *work at Transformational Activities /Extension Activities /Enrichment*

## 5. Good practices for the professional development of teachers:

### *The DiDeSu experience*

Even though differentiation appears to be very promising, one must be aware of its complexity and the challenges that teachers are up against while struggling to implement it into their everyday practices: limited preparation time, large class size, heavy workload, lack of resources and teachers' lack of skills and motivation to differentiate (Chan, Chang, Westwood, & Yuen, 2002; Scott, Vitale & Masten, 1998). Moreover, studies indicate that teachers do not only find it difficult to implement differentiation, but also fail to sustain its use over time (e.g. Schumm & Vaughn, 1991; Simpson & Ure, 1994; Ysseldyke, Thurlow, Wotruba & Nania, 1990; Westwood, 2001). Despite the fact that teachers recognize the need to differentiate, they believe that it is too difficult and time consuming and they often admit that they don't really know how to put the theory of differentiation into practice.

Teachers' resistance and resilience can be tackled and change can actually occur when training programs challenge the established hierarchy between the trainer and the practitioner and emphasize the participation and collaborative meaning making. To this end, effective programs are characterized as those that provide cohesiveness of purpose and facilitate a constructive dialogue about teaching and learning within and across various learning communities (Neophytou, Koutselini, & Kyriakides, 2011; Tatto, 1998). Acknowledging the fact that traditional top-down, one shot, lecture approach seminars are unable to convince their participants to embrace and sustain the proposed instructional changes, the emphasis is now placed on the creation of high quality professional development programs, that will be characterized by active learning, collective participation, a focus on content knowledge and instructional methods and will be closely related to the curriculum and the existing teaching realities and, last but not least, have sufficient duration and continuance (Borko, Jacobs & Koellner 2010; Mundry, 2005; Yoon, Duncan, Lee, Scarloss, & Shapley, 2007; Valiandes & Neophytou, 2017a).

Taking into account the main obstacles teachers encounter in their attempts to differentiate their lessons, along with the basic characteristics of effective professional development programs outlined earlier, DiDeSu was tailored to the teacher's needs, expanded over a period of two consequent years and included constant channels of support (e-learning platform, communication blog, on-site visits, telephone and email communications), that facilitated communication, collaboration and exchange of ideas between the participants and the trainers.

DiDeSu aimed to help teachers acquire the necessary skills and knowledge to effectively implement differentiated instruction, thus responding to the needs of all students in mixed ability classrooms. Furthermore, it aimed at establishing an ethos of collaboration within every individual participating school, by enabling teachers to rely on their own knowledge and expertise, to apply peer coaching practices, to jointly design lessons, to develop instructional material, to observe lessons of their colleagues, to evaluate, to reflect and to improve their practices.

This ethos was facilitated by applying various scaffolding processes in terms of support: Exterior expert support aimed to develop in-house expertise. As teachers became more familiar with the skills needed to implement differentiated instruction, exterior support was gradually reduced, thus allowing teachers to become the instructional leaders of their peers. Thus, DiDeSu developed learning communities in terms of practice that didn't rely on exterior experts, but utilized their own human resources to provide ongoing training and support to their faculty members.

More specifically, within the framework of DiDeSu, 4 training seminars (2 on differentiation & 2 on lesson observation) were organized in every participating country, hence providing initial training that empowered around 200 teachers to act as peer trainers, mentors and sup-

porters of their colleagues in their schools. These courses had a 15 hour duration that was distributed in 5 three hour meetings that were organized in the form of workshops where participants were able to cover a wide range of topics and disciplines (e.g. maths, language, geography, history) and engage in hands on activities. Further, by utilizing a blended approach, the seminars addressed both theory and practice. Thus, there was sufficient time between the various consequent meetings in which participants were able to apply, in their schools, the knowledge and skills acquired in the seminars and then reflect and discuss all these with the rest of the participants in the seminar.

After the completion of the seminars, the participants developed, along with their colleagues at schools, various lesson plans and supporting teaching material. In addition to the peer support, teacher trainers continued to visit schools and provide tailored-made support in various forms (i.e lesson observations, lesson design, feedback, theory building etc). The material produced by the teachers was both generic (general strategies and techniques for the application of differentiation) and specific (reflecting particular lessons or units in various disciplines of each country's curriculum).

Selected material was uploaded on the DiDeSu e-learning platform (e-class) in order to be used by anyone who might be interested in similar topics (including schools which were not directly engaged in the project). The DiDeSu e-class is a specially designed web based learning platform, developed to host all the material produced by the teachers, along with a discussion forum and other ICT tools enabling reflection, communication and collaboration of the participants. All teaching material on the e-class is organized in thematic units in order to be easily accessible. In addition, there is a discussion forum that enables participants to discuss and reflect on the posts of their colleagues.

Teachers who took part in DiDeSu argued that both the initial training and the ongoing support contributed to the effective differentiation of their instruction. Furthermore, they emphasized how useful the e-class proved out to be, not only in terms of their own self-regulated learning, but also in terms of communication and support with their peers and trainers. Teachers stated that DiDeSu gave them the opportunity to acquire new knowledge, but at the same time enabled them to implement this new knowledge in their everyday teaching practices. Furthermore, the participants pointed out that the observation of various lessons, gave them the opportunity to experience differentiation in authentic classroom settings, while the observation of their own teaching by teacher trainers and fellow teachers and the discussion that followed helped them improve the quality of their teaching. All these are recorded in interviews given by the participants after the completion of the projects.

To sum up, teachers who participated in a well-planned and systematic program that connected theory to everyday practice were able to effectively differentiate their instruction. Difficulties and obstacles that teachers experienced were transcended through collegial cooperation and the support from the experts. DiDeSu confirmed Valiandes and Neophytou (2017b) main results on the characteristics that are included in effective teacher professional development programs. These are a) the response to teachers' need by providing a program focused on both content and pedagogical knowledge, b) the duration of the program, c) the initial training and the follow up training sessions, d) the collaboration and communication with colleagues and experts, e) the constant, on site, support and help during the implementation and f) the development of personal skills for the self- reflection and self-evaluation of teachers.

Considering all these, we may argue that the overall success of DiDeSu provides additional support in the theory regarding the characteristics of effective teacher professional development/learning programs.