Differentiated Instruction in Secondary Mathematics

Differentiation means tailoring instruction to create an optimal learning environment for all students and their needs. Differentiated Instruction is a teacher's response to a learner's needs guided by the non-negotiables of differentiation which are: respectful tasks, clear learning goals, flexible grouping, ongoing assessment and adjustment, and responsive learning environment. Teachers can differentiate content, process, and product based on students' readiness, interest, and learning profile. Students vary in culture, socioeconomic status, language, gender, motivation, ability/disability, personal interests and more, and teachers need to be aware of these varieties as they are planning their curriculum. Teachers use the information learned through Readiness, Interest, and Learning Profiles to provide differentiated learning experiences in terms of **flexible grouping, ongoing assessment** and creating a **responsive learning environment**. This provides feedback for both the teacher and the student with the ultimate goal of improving student learning.

- *Content* – what the student needs to learn or how the student will get access to the information
- *Process* – varied activities students participate in to process, make sense, and "own" the knowledge, understanding, and skills essential to a topic
- *Products* – varied ways for students to show what they understand, know and are able to do
- *Learning environment* – the way the classroom works and feels
- *Readiness* – the current knowledge, understanding, and skill level a student has related to a particular sequence of learning
- *Interest* – what a student enjoys learning about, thinking about, and doing that evoke curiosity and passion
- *Learning profile* – a student's preferred mode of learning, how students learn best

Examples of Differentiating Content:

- *Audio/Video* – Provide taped passages of text or videos showing examples to enable students with encoding difficulties to hear or understand rather than read material that would otherwise be inaccessible. For struggling learners, textbooks can be loaded onto an MP3 player and listened to. Those who have difficulty writing can record their projects as an adaptation.

- *Cornell Notes* – Providing a graphic organizer such as Cornell Notes can assist those students who find note taking difficult. It is also beneficial to visual learners. This is the system used by our AVID program, so please seek out a team member from Cocoa, Eau Gallie, Palm Bay, or Rockledge.

- *Curriculum Compacting* – After pre-assessing student knowledge, content can be "compacted" for those who have mastery of the material. The time can be used to do enrichment activities such as independent study to expand their knowledge base.

- *Highlighted Material* – Providing material with highlighting on the main points can reduce the stress on a struggling learner and allow them to focus on the main points of the content. It can make a large chapter less overwhelming.

- *Mini-lessons* – Re-teaching parts of a lesson to those students who struggled with the content will target those with holes in their learning.

- *Varying/Supplementary Texts* – Using various texts or supplemental texts, that are written at different grade levels or languages that can convey the same meaning as the standard textbook. Materials in a student's native language helps assist him/her understand the English material. The internet is also a valuable source of information as long as students are given search parameters to keep them on track.

- _Visuals/Graphic Organizers_ – Use these while lecturing, thus engaging both visual and auditory learning modes.
- _Vocabulary Lists_ – Struggling students can be overwhelmed by new vocabulary. Providing a list or a fill in the blank allows the student to focus on the words.

Examples of Differentiating Process:
- _Group Work_ – Talking and interacting with peers allows information to be processed and can tap into higher learning as the discussion progresses
- _Tiered Activities_ – All learners work with the same important understandings and skills, but proceed with different levels of support, challenge, or complexity
- _Manipulatives_ – Hands-on supports for students who need them
- _Varying the length of time_ – The time a student may take to complete a task in order to provide additional support for a struggling learner or to encourage an advanced learner to pursue a topic in greater depth
- _Strategies_ – A list of strategies to focus on processing in the classroom

Creative problem solving	Cubing	Graphic Organizers
Interest Groups	Jigsaw	Journals
Learning Logs	Labs	Making Models
Philosophical Chairs	Role Play	Think-Pair-Share

Examples of Differentiating Product:
- _Options_ – Giving students options of how to express required learning and ability to show what he/she has learned throughout a unit

PowerPoint or webpage	Conduct an experiment	Create a game
Creating a model	Draw a cartoon	Give a speech/lecture
Make a brochure	Make a photo collage	Make a poster
Write an essay	Write journal entries	Write a poem/song/skit

- _Rubrics_ – A guide to match and extend students' varied skills levels
- _Alone or Groups_ – Allowing students to work alone or in small groups on their products
- _Student Created Product_ – Encouraging students to create their own product assignments as long as the assignments contain required elements

Examples of Differentiating the Learning Environment:
- Making sure there are places in the room to work quietly and without distraction, as well as places that invite student collaboration
- Providing materials that reflect a variety of cultures and home settings
- Setting out clear guidelines for independent work that matches individual needs
- Developing routines that allow students to get help when teachers are busy with other students and cannot help them immediately
- Helping students understand that some learners need to move around to learn, while others do better sitting quietly (Tomlinson, 1995, 1999; Winebrenner, 1992, 1996).

References:
Tomlinson, C. A. (2000). Differentiation of Instruction in the Elementary Grades. ERIC Digest. ERIC Clearinghouse on Elementary and Early Childhood Education.

Tomlinson, Carol Ann. (2001). *How to differentiate instruction in mixed-ability classrooms*. Alexandria, VA: Association for Supervision and Curriculum Development.

Differentiation Strategies for Various Learners

Strategies for English Language Learners	Strategies for Below Grade-Level Students	Strategies for Gifted or Above Grade-Level Students
• Always do vocabulary development component and allow extra practice to apply and use the vocabulary with the concepts	• Allow for kinesthetic activities where they organize the step-by-step processes on flash cards before they actually use the information to solve problems	• Offer accelerated activities or projects that extend their critical thinking, analysis, inquiry, and problem solving skills.
• Allow more time to simultaneously process the language and the content.	• Shorten the number of practice problems in a single work session.	• Require step-by-step explanations of the solution process.
• Start with concrete examples and use manipulatives.	• Allow partner work for oral rehearsal of solutions	• Shorten the number of practice problems.
• Use visual displays, illustrations, and kinesthetic activities.	• Model often, showing them step-by-step how to solve problems.	• Assign only the moderate and difficult problems.
• Offer notes that are partially filled in so that students can focus on necessary information.	• Allow use of manipulatives with meaningful, relevant application activities and discussions.	• Have the students create notes and procedural steps to guide the rest of the class.
• Reduce the total number of problems.	• Use activities centered on students' interests.	• Have students create games for practicing concepts and skills.
• Evaluate the use of word problems. Read them aloud and emphasize or underline key words that indicate procedural action.	• Have easy to follow notes of the most important procedural information already made up for these students to add to.	• Request oral presentations of the concepts, which will benefit all students in the classroom.
• Plan for oral rehearsal with partners of the academic language behind the mathematical concepts.	• Offer notes that are partially filled in so that students can focus on necessary information.	• Allow for these students to skip practice activities that they have already mastered.
• Allow for partner work.		• Let them assist other students in class.

Reference:
Frei, S. (2008). *Teaching mathematics today.* Shell Education.