Differentiation and Assistive Technology for Individual Needs

1. Models and Individual Needs

We discussed using task analysis and graphic organizers. What are some other suggestions our textbook has on meeting individual needs? Please read the “Meeting Individual Needs” of each chapter. Write one suggestion for each model below that may work for your lesson plan.

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| --- | --- |
| Model | Meeting Individual Needs |
| Direct Instruction (pg 77) | Flexible Grouping: Sandra works well with groups, these groups would allow her to see how others work out the problems and also give her an opportunity to talk through her work and try to explain how to solve the problems. |
| Concept **Development** or Attainment  (pg 96 or **115**) | Probing questions and think-pair-share strategies could work to help Sandra group items and think about what she is learning. Also, summarizing as a structured activity and having Sandra work with another student summarizing the concept learned. Each student talks about concept for 30 seconds, but cannot repeat anything said. |
| Inquiry (pg 143) | Sandra works well on a computer, so asking her questions and/or giving her problems and having her do searches or work with others to find solutions may be helpful. Also using data collection and focus groups could help Sandra understand the “why” behind the concept she is learning. She can also better learn how to apply the concept to real-life scenarios. |
| Cooperative Learning (pg 275) | Sandra would benefit from a jigsaw activity. She would be able to see the pieces of a concept and work to understand piece by piece. Sandra could also work as a researcher to find solutions to problems or how the concept relates to real-world situations. In her group, real-life questions could be asked to help Sandra understand and comprehend the question when it is in a different order or pattern. |
| Optional (your choice: p 164, 181, 204, 226, or **250**) Integrative Model | Sandra could benefit from a data set that is made up of the things she already knows from her earlier years of math. She has difficulty grasping the new concepts, but did good in math in middle school and the concepts build upon one another. I think if she was given a data set and asked to group the things in it and focus on what she knows she could learn a lot. Also she could benefit from the connections to real-world and answering questions that require more in depth thinking, since these are areas in which she currently struggles. |

2. Differentiation

Incorporate one type of differentiation for 4/5 of your lessons for your unit plan. You can either describe differentiation you are already doing or add differentiation. Only describe it for each lesson here, you do not need to resubmit all of your lessons. Afterwards, please add it to your lessons for your unit plan. The Differentiation chart handout gives an explanation of each type of differentiation.

Types:

* Tiered Assignments and Products
* Compacting
* Independent Study
* Interest Centers/Groups
* Flexible Grouping (roles in groups)
* Multiple Levels of Questions
* Learning Contracts
* Choice Boards

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| --- | --- |
| Model Lesson Plan | Type of Differentiated Instruction with short description. (Only need 4) |
| Direct Instruction | Flexible grouping. Sandra working as a researcher or speaker. She can pair up with a student near her and work through problems and examples. This will allow Sandra to work with and learn from others to build her skills. She would also be able to ask questions and collaborate with her peers. Sandra is a smart student, she just has trouble understanding what problems are asking her and how to reach a solution. Talking with other students seeing how they solve problems should help Sandra become more familiar with the concept and more comfortable with the problems. |
| Concept Development or Attainment |  |
| Inquiry | Multiple Levels of Questions. Sandra works well with researching and computers so using different levels of questions and giving her resources and tools to find the answers would be helpful. She could also be given word problems and real-life application problems and research tips and tools to help her solve them. Word problems are an area where she struggles and this would help her become more familiar with them and the way they are structured. In using multiple levels of questions the teacher picks the questions based on the student’s readiness level and strengths and weaknesses. This tool also allows students to build upon what they already know and the knowledge they have gained from other student’s answers and comments. Sandra could benefit greatly from both her own research and the research of her classmates. |
| Cooperative Learning | Interest Centers or Interest Groups. These groups are set up so that learning experiences are directed towards specific learner interests. Students can pick subtopics and form groups to teach and talk with other classmates. These groups do address student readiness. A group such as this would be beneficial for Sandra because she could bring her opinion to the table and join the groups that are discussing the things she does not understand. In an interest group, the more knowledgeable students could work with Sandra to help her understand the concept and its pieces. |
| Choice (model of your choice) Integrative Model | Compacting. Compacting allows the student to eliminate practice as they master skills and concepts. This strategy would branch off of what Sandra already knows and allow her to see how concepts relate to each other. Using this strategy, Sandra could create a study plan and create learning goals. She could focus on her strengths and use them to help her research and learn about new concepts. Sandra could also work with others some and discuss what she is learning. Once she grasps the concept she could also try enrichments or accelerated learning tools. |

3. Accommodations and Modifications: Strategies

Case Study: Sandra

* What are the student’s Strengths and Affinities? Name 3.

1. Sandra has a good memory and is very good at remembering facts and formulas.
2. Sandra works well on a computer, knows how to navigate the Internet.
3. Sandra wants to be a teacher and loves her housing design class. This class seems to be the class that she is doing the best in.

* What are the student’s concerns? Name 3.

1. Sandra struggles with understanding metaphors, symbolism, abstract language and other forms of figurative language.
2. Understanding concepts and understanding when and why to use certain formulas and equations.
3. Grasping important ideas in classes.
4. Completing her homework assignments is also a concern. Currently, Sandra does not complete homework because she does not understand concepts.

* What are 3 interventions you can use to help this student in your subject area?

Hint: Use the strengths to help overcome the concerns.

1. Help Sandra understand what a concept is. Have her break concepts down and understand each part. Also have Sandra group similarities and differences and provide examples of the concept. Have the examples go from very straightforward to more abstract, such as word problems and application problems.
2. Have Sandra use multiple representations to help her remember information. She works well on a computer so she can research and find online activities about topics and concepts. She can also talk about the concept with others and visualize the concept. These representations and hands-on activities can help Sandra to really understand the concept and how it works it real-life situations.
3. Sandra would benefit from any kind of activity requiring her to identify patterns in word problems. For example, if she was given an interest problem about some amount of money she could work the problem for $1000 and $1500 and observe what happens to the amount in each case. Sandra could also be given problems and asked to identify the key information within the problem. She can then figure out what she knows and which formula that particular information fits into. This would help her practice and gain an understanding of what each formula represents and how it can be used.

* What is one strategy you would use with the student and why? Please describe it briefly.

One strategy that would work well for Sandra is FAST DRAW FOR ALGEBRA. This would work because the strategy focuses on solving word problems and identifying what the question is asking and what the important information is. Sandra struggles with these things in her math classes and this strategy really could help.

The steps of the strategy are:

**F**ind what you are solving for.

**A**sk yourself, “What information is given?”

**S**et up the equation.

**T**ake the equation and solve it.

**D**iscover the sign.

**R**ead the problem.

**A**nswer the equation, or draw and check. **W**rite the answer for the problem.

The strategy focuses on helping students solve word problems. Sandra could use this strategy in both her math and physics classes.

* What are the steps to teaching a strategy? List them.

Step 1: Secure the student’s commitment to learning the strategies. This is the most important step. Explain the benefits of mastering the strategies. Make sure that the student understands that they will have to work hard, but the payoff is improved grades.

Step 2: Identify the specific problems that the student is having with her classes. Have the student write down all the grades that she is receiving in each class. Discuss what the most difficult tasks are and why.

Step 3: Use the Learning Toolbox Questionnaire. Print two copies of the questionnaire. Give one copy to the student to complete independently, and complete a copy yourself. Meet and compare the responses.

Step 4: Use the student’s classroom performance and the results from Step 3 to identify the areas that are the most need of attention. Prioritize problems in this order: organization, study skills, test taking and note taking. Once problems in these areas are overcome, address problems in reading, writing, math and advanced thinking.

Step 5: Do this before meeting with the student. Study the strategy that “matches” the area of difficulty identified on the questionnaire. Practice applying the strategy so that you know how to use it.

Step 6: Go to the website with the student at the meeting. Explain the purpose of the strategy using advance organizers and review any relevant skills.

Step 7: Model the strategy by going over each step and using the examples on the website. Then model its use in relation to a specific course assignment.

Step 8: Provide guided practice and assist the student in applying the strategy to their assignments. Print a copy of the strategy for the student to keep in their notebook.

Step 9: Continue with guided practice until student is ready for independent practice. Get feedback from all of the student’s teachers about the student’s status in their classes.

Step 10: Have parent’s assist in providing independent practice at home. Encourage the parent to access the parent site of the Learning Toolbox to learn how they can help their child at home.

Step 11: Have the student work to generalize the use of the strategy to their other classes. Collaborate with the student’s other teachers. Plan specific opportunities for the student to apply the strategy to another class.

4. Informal Reading Inventories

1. Type out or scan or copy and paste the 100 word passage.

In this section, you will study second-degree polynomial functions, which are called quadratic functions. Let a, b and c be real numbers with a ≠0. The function given by f(x) = ax2 + bx + c is called a quadratic function. Often real-life data can be modeled by quadratic functions. The graph of a quadratic function is a special type of U-shaped curve called a parabola. Parabolas occur in many real-life applications, especially those involving reflective properties, such as satellite dishes or flashlight reflectors. All parabolas are symmetric with respect to a line called the axis of symmetry, or simply the axis of the parabola. The point where the axis intersects the parabola is called the vertex of the parabola.

Taken from: Larson, Hostetler, & Edwards. (2008). Quadratic Functions page 92. *Precalculus with limits: a graphing approach* (5th ed., ). Boston, Mass.: Houghton Mifflin.

1. Create 5 comprehension questions for the passage you choose. Make sure two questions are factual and two are inferential (inferential - based on interpretation; not directly expressed). The fifth can ask about the meaning of a vocabulary word.
2. Factual: What is the function that represents a quadratic function?
3. Factual: All parabolas have what general shape?
4. Inferential: Using the examples already provided above, can you name 3 more ways that parabolas are seen and used in everyday life?
5. Inferential: If the vertex occurs at the point where the axis intersects the parabola, then which coordinate of the vertex is the same as the point of the axis of symmetry?
6. Vocabulary: Define the vertex of a parabola.

Answers: 1. f(x) = ax2 + bx + c

2. U-shaped curve

3. arches, water fountains, bridge cables (Golden Gate Bridge)

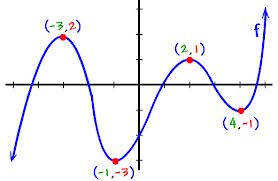
4. The x-coordinate of the vertex and point of the axis of symmetry will be the same. For example if the axis of symmetry is at the point x=3, then the vertex will have the coordinates (3,y), where y is the value where the parabola crosses the axis of symmetry.

5. The vertex of a parabola is the point where the axis intersects the parabola.

1. If a student read the passage with 7 oral reading mistakes and missed 2 of the 5 questions, what level would you say it was on according to the handout? Why?

I would say that this student is on the Instructional Level. Word recognition is at about 93%, but comprehension is only at 60%. The student understands enough of the material to answer some of the questions, but not all of them. This means that they would probably benefit from some guidance from the teacher. The student can read the passage pretty good, but needs help comprehending what has been read and how it applies to the questions that were asked. The student is on the learning level that is expected in the classroom.

1. In math, science, social studies, and language arts students also need to learn how to understand graphics, photos, graphs, charts and maps. Write one comprehension question each for any two graphics found in your textbook or online.

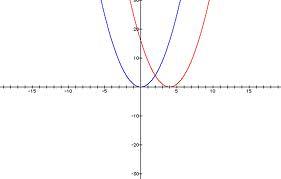


*Taken from:* [*https://encrypted-tbn2.gstatic.com/images?q=tbn:ANd9GcRlk89eEtHL9T0oW9PlvUZgReG3FBDxDqxXEGXB2fWHJq\_TXM0FXA*](https://encrypted-tbn2.gstatic.com/images?q=tbn:ANd9GcRlk89eEtHL9T0oW9PlvUZgReG3FBDxDqxXEGXB2fWHJq_TXM0FXA)

Which points on the graphs represent maximum values and which represent minimum values?

Answer: Maximum values: (-3, 2) and (2, 1)

Minimum values: (-1, -3) and (4, -1)

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*Taken From:* [*http://jwilson.coe.uga.edu/EMT668/EMAT6680.Folders/Barron/unit/Lesson%206/image33.gif*](http://jwilson.coe.uga.edu/EMT668/EMAT6680.Folders/Barron/unit/Lesson%206/image33.gif)

What transformation occurs from the blue parabola to the red parabola?

Answer: The graph shifts 4 units to the right.

5. Graphic Organizers and Study Guides

A. Graphic Organizers:

Please describe when you have used these techniques in your lessons. If not, where could you put them? You should have two of these organizational aids in your unit.

Description of Graphic Organizer 1: One graphic organizer that I have incorporated into my unit is the Guided Problem Solving organizer. I have implemented this organizer in my last lesson, which focuses on the application of matrices and systems of equations. The organizer talks the student through the process of solving a word problem. It starts by having the student identify what they know and what they need to find out. From there the student is asked to identify what formulas and strategies they can use and plug what they know into those formulas to solve the problem. What I really liked about the organizer is that the last step asks the student to determine if the answer seems reasonable and check their work. This organizer would be great for all students, but I think it will be especially helpful for Sandra. She struggles with word problems, and needs a step-by-step process like this to follow to solve the problems. She struggles with problems that are in different formats or don’t follow a set pattern as well. This organizer would allow her to break down the problems, and in doing so, Sandra will be able to see the similarities and solve the different types of problems.

Description of Graphic Organizer 2: The second graphic organizer that I will be using in my unit is a form of a Four-Column Chart. This organizer will be introduced in my first lesson, in which students will be given multiple methods for solving systems of equations. The three ways to solve a system of equations are substitution, elimination, and by graphing. The students will use one column for each method and will be asked to write down the steps and provide examples of each method of solving. This will help the whole class understand the different methods, and will definitely help students with learning disabilities, such as Sandra. Sandra can use the organizer to help her see the different methods and compare and contrast them. She can keep the organizer in her binder and practice solving the same problem using each of the different methods. The more she practices, the better she will retain the information and the process of solving the systems of equations.

B. Study Guides:

Describe or develop one example study guide (either guided notes or visual model) for one of the lessons for your unit.

For my lesson on Matrices and Systems of Equations, I will be giving the class guided notes. This lesson will be a Cooperative Learning Lesson and so the student’s will be in groups and working together to learn the concept. The guided notes will help guide their conversation and also ensure that the students are retaining the most important information from the lesson. The notes will also contain examples and some form of step-by-step directions. These directions may be fill-in-the-blank or any form that requires student input. Notes such as these will be beneficial for Sandra. She needs practice recognizing problems and understanding steps. She can also use tools like these to help her with her homework, and other out-of-class assignments. Also, the notes could contain spaces for student’s to create their own problems and to research application problems. This would give Sandra a chance to talk to her peers about how to complete the problems and also give her practice with word problems.

6. Alternative Materials

b. Math Case.

- Would virtual manipulatives be useful for you in your unit or teaching your class?

I think that the virtual manipulatives are very cool and would be highly helpful in a math classroom; however, for my particular unit, they would not be of much use. My unit is based on a Calculus classroom, and most of the manipulatives are focused on Algebra and Geometry concepts. A more advanced version of the manipulatives is what I would need for my unit. The students could benefit from a version of Grapher in which the students can see two or more functions at one time, however finding manipulatives like this is difficult.

- What real life items do you think you could use to teach high school mathematics if you were not able to buy manipulatives?

To teach matrices in my lessons, I could bring sticks and some form of candy or something to use to represent the numbers in the matrix. The students could then create the matrix on their desk and show how to perform operations with matrices and how matrices and systems of equations are related. This activity would allow the student to work with matrices in an interactive and creative way that will hopefully help the student’s retain and understand the information better.

Activities involving any kind of creative elements like this are beneficial in math classrooms. Also, with these kinds of activities, teachers can work in real-life problems and applications. This is something that would help a student like Sandra with complex and word problems. Students understand better when they can visualize and talk about concepts. Activities like this give them a chance to do just that.

7. Assistive Technology Module

a) Name at least three items that could be considered AT and describe how those devices could support a student with a disability in the classroom.

Mathematical Equation Software: This device works kind of like a calculator, only the student inputs the equations into the computer instead. Most of the software can commute things such as fractions, square roots and complex formulas and equations. The student can access and find functions easier on this software than on a calculator, making it very helpful for students with disabilities.

Handheld Magnifier: A handheld magnifier works like a camera or recorder. It allows the student to magnify white boards or posters that may be hanging on classroom walls. This device would work great for a student who has a visual impairment or has difficulty seeing things from a distance. The student could instantly magnify notes and projections in class and follow along with everyone else. The student could read aloud from the board and could even use the magnifier to view presentations or class projects from a distance.

Dycem Nonslip Surface Covering: This device works to keep things such as pens, pencils, paper and other supplies from rolling or sliding off a student’s desk or work area. This would support a student with a disability because they would not have to worry about their materials falling on the floor out of their reach. This device would also help students keep math tools and devices such as calculators and protractors within their reach.

b) Explain two reasons why it is necessary to consider AT for students with disabilities.

First, it is necessary to consider AT for students with disabilities because with these technologies, many students will continue to struggle academically. Assistive technology greatly improves the functional performance of students with disabilities and therefore should be implemented whenever and wherever it is possible. Second, schools must consider AT for students with disabilities because the school must ensure that all students have access to a free appropriate public education. If the school fails to consider and provide AT, then they are failing to provide this.

c) Why is it important to consider both AT devices and services?

It is important to consider both AT devices and services because one functions better along with the other. The AT devices give the students a tool to help them understand better and enhance the learning experience. AT services help the student use the devices in the best way possible. Both of these things are greatly helpful to the student, but they work better when they are used together in a way that assists the student. In a way, the services and the usage of the devices is what determines how well the device works for the student. Without good services, the device is not being used in the best possible way.

d) Describe three responsibilities of the Implementation Team.

One of the main responsibilities of the Implementation Team is to develop a plan to help guide the implementation of assistive technology and to ensure that all related activities are completed. These plans include all information about the team and the role of each member, what AT devices and services will be used and how they will be used, how the student, parents and teachers will be trained on the devices, and how the assistive technology will be evaluated and monitored.

Another responsibility of the Implementation Team is to implement the plan and the needed assistive technology devices and services. The team designates a person to obtain and customize devices to fit each student. This person also educates the student, parents and teachers about how the devices operate.

Third, it is the responsibility of the Implementation Team to monitor and troubleshoot to make sure that the student is receiving the maximum benefit from the assistive technology that is being used. If the AT being used is not working, then it is the job of the team to discuss and implement a new plan and new devices. It is the job of the team to do all of the necessary problem-solving, until the right AT is found.

1. Imagine you are a teacher (let me know your grade and one subject area) and a student in your class has an upcoming IEP meeting. What types of information should you gather ahead of time to contribute to the discussion of the student's AT needs? Name at least four.

I am teaching Pre-Calculus, 12th grade. Information I should gather for an IEP meeting includes:

1. A knowledge of any current AT being used and its effectiveness in the classroom.
2. A knowledge of the student’s status and ability in my classroom.
3. A list of the student’s strengths and successes in the classroom.
4. A list of areas in which the student needs improvement.
5. How you are accommodating the student and your level of success.

8. Accessibility

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| Tool | Pros | Cons |
| Narrator | Would work well for blind, visually-impaired, reading disabled and people with low writing skills. The tool can read Internet and word documents. | Kind of slow, stutters, have to set it up, kind of difficult to get to work. Not compatible with all webpages. |
| Magnification | Would be very helpful for visually-impaired students. Magnifies everything on the screen, including icons and webpages, would be great for helping a visually-impaired student read an article online or complete a webquest or other activity requiring reading and working on the computer. | Shrinks the screen, takes longer to read the screen. |
| On Screen Keyboard | Very helpful for students with limited mobility. Great if the keyboard goes out on your computer. | Keyboard sometimes covers a part of the screen, might cover up a document that the student needs to see. The process is very time consuming because you can only type with one finger, one key at a time. |
| Mouse changes  Keyboard changes  Screen changes | On mouse changes, can set up where when the mouse hovers over an icon it opens. This is a great tool for students with mobility difficulties or students who have trouble clicking the mouse.  The sticky keys and filter keys would help students who struggle with mobility. Both would assist with typing and written assignments.  Can change the screen resolution, brightness and orientation. These tools can be helpful to visually-impaired students. If they see light things, can adjust screen brightness accordingly, etc. | On the mouse changes, the mouse moves really slow.  Sometimes the sticky keys work too well and might pick up codes that the student did not mean to input.  Screen changes will not be helpful to many students. Other changes would probably be much more beneficial. |

Assistive Technology. Try to write an entire paragraph using Dragon. How successful were you?

The text for the most part, was accurate. There were a few minor mistakes, such as misspelled names and lack of punctuation, but that was understandable. I found that the closer I was to the microphone and the slower I spoke, the better the results were. Also, the more I spoke the better I understand the way the app worked and I was able to see the accuracy improve.

Software. Try out the other games and assistive tools on the IPAD with your partner. Did you find any that you think would be useful in class?

Yes, one app in particular was something I think could be of use in all math classes. The app drilled students on addition, subtraction, multiplication and division. You can choose to be drilled on a mix of problems, or just chose one type, such as subtraction. Students today struggle with these things and I think apps like this that drill in a fun and interactive are a good tool to use to help student’s become more proficient.

Case Studies. Do you have any suggestions for devices the people in these case studies could use?

1. To help with reading, the youth could use the magnification tool and narrator. This type of device would help him see the words better and would also read the words back to to him so he could understand directions better. Also, to help with his writing and legibility, the youth could use word prediction software or some type of alternative or on-screen keyboard to type up notes and orders.
2. This student would benefit from using the on-screen keyboard and the magnification tool. The keyboard would allow her to type, and the magnification would help her read small print and fill out job applications. She would also benefit from the AT Joystick Input Device. She knows how to use a joystick, and a device such as this would help her navigate a computer and the internet.
3. This student would benefit from a device that would type what the students were saying, so that the deaf student could read the conversation. Then the student would be able to type back responses and communicate with the class. The teacher would have to modify the assignment some, for example use a website that is compatible with the student’s AT devices.
4. This person would benefit from the use of a recorder, or some other device that they can simply talk in to. The student might also be able to use Text Readers and devices like Dragon that connect to their computer and type as they talk. The student could use a device like this because they do good talking and doing presentations, just not at writing everything down. A device like Dragon would play off of the student’s strength.