Assessment of Assistive Technology for ████████, ██████ School System and Implications of Universal Design Principles

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Table of Contents

<u>Assessment of Assistive Technology for</u>
<u>School System</u>

My assessment of assistive technology at a district level proved to be very disappointing. My district is in desperate need of assistive technologies and an understanding of their uses. I have taught in the district for two years and have never seen any assistive technologies at my school, but I thought that surely we had them. I just figured that I did not know about them. WRONG!

To begin my assessment I contacted my principal. I was rather shocked to find that we do not have any assistive technology at my school. Granted we do not have any students with "major" disabilities, but we have several students with learning disabilities and ADHD. My principal pointed me in the direction of another elementary school in the district.

The next contact I made in the district was an elementary school that has a blind student. Assistive technology is used for her on a daily basis. She uses a Braille note taker, an embosser, an abacus, Perkins Braille, and her text books are in Braille. She also uses JAWS software, a slate and stylus, and Braille dots.

This school is also the setting for the district's FMD (functional mentally disabled) unit. The FMD classroom uses no assistive technologies. The more I investigated my district's assistive technology, the more I realized the district was receiving a failing grade.

To complete my assessment, I contacted our Board of Education and they linked me to our district's special education director. She told me the only assistive technologies in the district are for the blind student. I held a conversation with her about the universal design class that I am taking. The response I received was appalling. I was told that assistive technology sounds nice to have, but that it costs too much money. She said that assistive technology would only be purchased for students with "major" disabilities. I explained that

a universally designed classroom with assistive technologies is for all students—not just for those with disabilities. To summarize our conversation I was told the concept of UD (universal design) sounds great, but the lack of funding makes it impossible. I have to wonder if it is the lack of funding in my school district or the lack of positive attitudes.

After my conversations, I found that my district is lacking in the field of universal design. It is hard for me to believe that out of 1000 students we only have one student who is in need of assistive technology. I also think the lack of knowledge of the term universal design is a factor in my district. When I talked with my principal about the class, she asked me to present the concept of universal design to my fellow teachers. I am hoping that assistive technologies will become available in my school district in the coming years.

<u>Designing Units That Meet Universal Designed Learning Theories and Practices</u>

When I reviewed a current format of a unit that was used in my classroom, I found that it was lacking universal design. I had one assessment for all of my students. When thinking of how I could re-design my unit, I considered these factors:

- Universal design and inclusion for learning when creating lessons and assessments

- Integration of activities that promote and encourage thinking, problem solving, and other cognitive strategies to meet individual needs

- Consideration of technology to assist in the planning and management of the teaching and learning environment

- Preparation of lessons that use technology applications as a tool to teach

- Selection and adaptation of technology according to learner needs and characteristics

I am going to highlight each of these factors in the paragraphs below. Each of these aspects has been included in my universally designed unit.

A**) <u>Universal Design and Inclusion for Learning</u>**

When I began reviewing my original unit, I asked myself, "How can I include all students in these lessons?" Through the reading of <u>*Teaching Every Student in the Digital Age: Universal Design for Learning*</u> (Rose & Meyer), I knew there were several factors to consider. I had to create learning goals that would include all students. I also needed to develop the lessons to create individualized approaches for reaching these goals. To create universally

designed lesson, I had to rely on differentiated instruction as a focus. Differentiated

instruction needed to be in place for all of my students, not just those with special needs.

To support students' diverse recognition networks:

- Provide multiple examples
- Highlight critical features
- Provide multiple media and features
- Support background content

B) **Integration of activities that promote and encourage thinking, problem solving, and other cognitive strategies to meet individual needs**

When thinking about how I could include all of these areas in my lessons, I referred

back to the text of Rose and Meyer. The book featured descriptions of the three networks

(recognition, systematic, and affective). I used this awareness to analyze my lessons to

include activities to meet all students learning needs. The authors included a chart listing

guidelines for teaching strategies to support diverse learning on page 109 of the text. I have

included the chart below.

To support students' diverse strategic networks:

- Provide flexible models of skilled performance
- Provide opportunities to practice with supports
- Provide, ongoing, relevant feedback
- Offer flexible opportunities for demonstrating skills.

To support student's diverse affective networks:

- Offer choices of content and tools
- Offer adjustable levels of challenge
- Offer choices of rewards
- Offer choices of learning content.

Network-Appropriate Teaching Methods

It is important to include several of these characteristics when designing lessons. When reviewing my lessons, I included many of the teaching methods listed above.

The brain is a very complex structure and being able to evaluate each student's brain networks is a difficult task. When considering the students recognition network a teacher needs to consider several aspects. Is the student a good observer? Do they have advanced reading abilities? Are they colorblind? Do they have low vision? There are several things to consider when analyzing the strategic network as well. Is the student organized or artistic? Do they have good written expression, poor spelling, or poor handwriting? You must also consider the affective network. Is the student confident, focused, or withdrawn? Do they have difficulty working in groups?

I have included detailed observation sheets in Appendix A of the three brain networks. These sheets highlight different strengths and weakness in all networks of the brain. It is my recommendation that a teacher takes time to observe and consider every item on the lists for all students in their class. The information obtained from these lists can act as a framework for creating lessons.

For learning to be successful, the goals of the lesson should relate to the three networks. If the goals are too simple, the students will become bored and disengaged. If the goals require too much thinking, the students could become aggravated and not even try to complete the assignment. When I designed my lessons, I focused on having activities that require the students to think just beyond their level of knowledge. Both the activities and assessments were differentiated and employed a variety of modalities so that all students can select those that best meet their needs and learning styles.

C) Consideration of technology to assist in the planning and management of the teaching and learning environment

When I do learning centers, I always have contracts for the students to sign. These contracts make the students accountable for the activity they choose to complete. I keep the contracts in a folder in order to observe what learning choices the students make. I also use technology for record keeping purposes. I create checklists and type up notes to use for re-teaching. During the unit lessons, the students receive study sheets from the class lists we made. During one of the lessons, we list the characteristics of the three types of clouds. After the compilation of the class list on chart paper, each student receives a typed copy of the list to use as a reference when completing the learning center activities.

D) Preparation of the lessons that use technology as a tool to teach

During the unit, I use several websites during the lessons. The websites are http://brianpop.com, http://www.first-school.ws/activities/science/drippy.htm and http://kidzone.ws/water. These websites are very colorful and engaging. They appeal to

visual and auditory learners. The first two websites show videos that read to the students. I also use an overhead projector during a partner activity

E) Selection and adaptation of technology according to learner needs and characteristics

Several available technologies can be adapted for student usage. In my unit, I left many of the assignments open to student choice. This will not put technological barriers on any of the students because they can choose the activity that is right for them. When selecting and adapting technology for the unit, I kept all types of students in mind. Not only did I concentrate on students who have disabilities such as low vision or deafness—I focused on students on students with learning disabilities and attention disorders. I also considered technology for average students. I have created a table showing some assistive technologies that were used in my unit.

Technology	Primary Applications for Student Use
Magnifier	Magnifies Text
Large Key Keyboard	Large, bold keys that are easily seen
Braille Key Caps	Type using Brailed keys
Voice Recognition Software	Students speak text and it is written for them
Zoom Text	Computer screen magnifier to make text larger
Topaz	Desktop magnifier that magnifies any text
Duxbury Braille Translator	Translates print to Braille and Braille to print
Braille Dots	Used for writing
Simon Reading Machine	Reads text aloud
Inspiration and Kidspiration	Organization Software

Auditory Trainer	Eliminates distracting background noise
Read & Write	Support software-creates and edits text
Kurzweil 3000	Speaks words while typing, fixes spelling errors creates outlines

Name: ▮▮▮▮▮▮▮▮▮   **Age/Grade Level:** 1st

Subject: Science   **Major Content:** Lessons 1-Clouds are Formed

Unit Title: All About Clouds

Goals:

1) Students will explain that when warm air meets cold air, a cloud forms from

drops of water.

Connections:

S-P-ESS-6
Students will understand that weather changes from day to day and over the seasons.

S-P-SI-3
Students will use evidence (e.g., observations) from simple scientific investigations and
scientific knowledge to develop reasonable explanations.

Context:
Students have been briefly introduced to the three main cloud types (cumulus,
cirrus, and stratus) during our previous unit on weather. We are going to build on
that unit and the concept that weather changes from day to day. In today's
lesson the students are going to learn how clouds are formed.

Modifications:
In this lesson, I will place my special needs students near the demonstration and
give them additional time to complete the assignments. Assistive technology will
be used throughout the lesson. Refer to the assistive technology resources table
for a list of the technologies that are used.
My speech students will benefit from question/answer strategies throughout the
lesson.

Resources:
Chart Paper
24 metal spoons
Refer to assistive technologies chart

Procedures:

1) Essential Question: How does a cloud form?
2) Real Life Connection- What happens when you exhale (breathe out) outside on a cold day? You see your breath. How many of you have seen your breath on a cold day? This is what happens when warm air from your body meets the cold air outside. Today we are going to learn how a cloud forms when warm air meets cold air. Do you think it will be like us breathing outside on a cold day?
3) Gather a jar with lid, warm water, and ice cubes. As a class, predict what will happen inside the jar. List the predictions on chart paper. A copy of the predictions will be made for students who are visually impaired. I will place the student's with needs close to the experiment.
4) Pour warm water into the jar, wait, then pour most of the water out.
5) Set the lid upside down on the jar, put the ice cubes on the lid, and observe what happens. The observation will be conducted visually and orally. Detailed descriptions of what is happening will occur during the lesson.
6) Explain that clouds are tiny droplets of water and the droplets come together to make a cloud. Discuss that the warm water and ice cubes formed droplets of water that came together to make a cloud inside the jar.
7) Have the children cup their hands around their mouths and exhale into their hands. They can also do this activity with their arms. Repeat several times. Help the children notice that their breath feels warm and moist.
8) Pass out the spoons. Have the children notice that the spoons feel cool. Hold the back of the spoon close to your mouth and exhale. The spoon can be held for a child if needed. Have the children repeat this procedure.
9) What do they see? Explain that a tiny cloud appears on the spoon.
10) Help the children understand that the tiny clouds on their spoons are like the clouds in the sky that form when warm, moist air and cool air come together.
11) As a whole group we are going to orally review each step of the experiment.
12) The students will complete a journal entry, based on what they have learned, and describe what it might be like to be a cloud. They will use the method of their choice to complete this assignment. They can write, type, draw, orally record, etc. (Several assistive technologies will be used.)
14) Share the journal entries and refer back to the essential questions.

Assessment:

Formative
Throughout the lesson, I will observe students' responses to the activities to see if they comprehend the topic. I will ask students individually to tell or show me how a cloud is formed. Their responses will be recorded.

The journal entry is going to be used to determine how the children are thinking about clouds at this point in the unit. I am curious to see if they are thinking about clouds scientifically or if they are going to simply state they would be happy, sad, etc.

Summative
The students will correctly identify the steps in the experiment in. They can choose the method for which they will be grade. They can identify the steps orally, through drawing, type the steps on the computer, draw the steps on the computer, write the steps, etc. Each step will be worth 10 points.
4-Identified all 4 steps   40pts.
3- Identified 3 steps   30 pts.
2- Identified 2 steps   20 pts.
1- Identified 1 step   10 pts.
0- Did not identify any steps   0 pts.

Name: ███████████   **Age/Grade Level:** 1st

Subject: Science

Major Content: Lesson 2-How to Identify the 3 Main Cloud Types

Unit Title: All About Clouds

Goals:

1) The students will be able to identify the 3 types of clouds (cirrus, cumulus, and

stratus) by their characteristics.

Connections:

S-P-ESS-6
Students will understand that weather changes from day to day and over the seasons.

S-P-SI-3
Students will use evidence (e.g., observations) from simple scientific investigations and
scientific knowledge to develop reasonable explanations.

Context:
This is the second lesson in the unit on clouds. The students have briefly been
introduced to the three cloud types and they have learned how clouds are formed
in the sky. In this lesson they are going to learn to identify the three types of
clouds based on the characteristics of each cloud type.

Modifications:
Flexible assessments will be provided. We will have a partner activity where
students with limitations will be placed with a student that counteracts their
limitation.

Resources:
Digital Camera
The Cloud Book by: Tomi Depola
SmartBoard projector
http://brainpop.com
overhead projector
It Looked Like Split Milk by: Charles G. Shaw
Shaving Cream
Cotton Balls

Blue Construction Paper
* Refer to assistive technologies table

Procedures:

Day 1
13) Essential Question: How would you explain the differences in clouds?
14) Real Life Connection- <u>Read It Looks Like Spilled Milk.</u> Ask: Have any of you played the car game where you look at the clouds and try to find pictures in them? We have talked a little about the three main types of clouds. Today you will learn about each of the cloud types and you will be able to tell if cirrus, cumulus, or stratus clouds make the "picture" clouds.
15) Using the SmartBoard projector and the website http://brainpop.com, have the students view the movie on clouds and take the online quiz. We will do the review quiz. Students with low vision can use a screen magnifier and view the website along with us on their computer. Students with hearing impairments can have headphones plugged directly into the computer for increased auditory sound. Each student will write down their answer or record their answer on a computer and then the computer will tell the correct answer. They will re-take this quiz for a grade the next day in the computer lab. Each student will have the quiz read to them by a fourth grader and the fourth graders can write answers for students who are unable to write.

Day 2
Review the activities from the previous day.

16) As a whole group, read <u>The Cloud Book</u> by Tomi DePola. Discuss the characteristics of the cirrus, cumulus, and stratus clouds. List the characteristics. After the class has made a list of the characteristics, each student will be given their own copy of the list. (The list can be written in Braille using the Duxbury Braille Translator.)
17) Display the song *Cloudy Serenade* on chart paper and pass out each student a copy of the song. Sing the song and talk about the characteristics. It is sung to the tune of Mary Had a Little Lamb.
> *Cirrus clouds are wispy curls, Wispy curls, wispy curls. Cirrus clouds are wispy curls. They form high in the sky.*
> *Cumulus clouds are piled up high, Piled up high, piled up high. Cumulus clouds are piled up high. They soar on sunny days.*
> *Stratus clouds are sheets of gray, sheets of gray, sheets of gray. Stratus clouds are sheets of gray. They stay close to the earth.*
> *Cirrus, cumulus, stratus too. Now it's out. There is no doubt. Cirrus, cumulus, stratus too. We know them all. Hooray!*

18) The students will be doing a partner activity. They are going to work together to successfully explain and draw the characteristics of the three cloud types. One partner will describe the cloud and the other partner will use the description and draw it on an overhead projector.

19) For individual practice the students are going to choose from a variety of learning center options. They can choose one or two centers. In the centers they are going to identify the three types of clouds by using their characteristics. They will be allowed to use the class handout that describes the cloud characteristics. The centers are:

     a) Recording center- The students can use a tape recorder to orally describe the three types of clouds.

     b) Drawing by hand- The students can use their knowledge of the characteristics and draw the three types of clouds.

     c) Shaving Cream- They can use shaving cream to draw the three types of clouds and orally explain their characteristics.

     d) Writing- The can write about each of the clouds characteristics.

     e) Computer- They can use the computer to type the characteristics or use a drawing program to draw the three cloud types.

The students will also have a choice on which of the centers they want me to evaluate for a grade. They can either choose one center or a combination of two centers.

Assessment:

Formative
The students are going to take the online quiz at the end of the brain pop section on clouds. I am going to use the assessment to determine what I may need to review.

Summative
The students will retake the quiz over clouds after I have seen what I may need to review. This quiz will be used for a grade. Each question will be worth ten points, for a total of 100 points.

The students will be evaluated on their learning center activities.

100%- All of the clouds are identified correctly	30/30
67%- Two of the clouds are identified correctly	20/30
33%- One of the clouds are identified correctly	10/30
0%- None of the clouds are identified correctly	0/30

Name: ███████████   **Age/Grade Level:** 1st

Subject: Science

Major Content: Lesson 3-The Water Cycle

Unit Title: All About Clouds

Goals:

1). Students will show or demonstrate an understanding of the water cycle and

how we are drinking the same water as the dinosaurs.

Connections:

SC-E-2.22 Objects in the sky (e.g., Sun, clouds, moon) have properties, locations, and real or apparent movements that can be observed and described.

S-P-ESS-4
Students will understand that common objects in the sky (e.g., stars, clouds, airplanes) have properties, locations, and movements that can be observed and described.

S-P-ESS-6
Students will understand that weather changes from day to day and over the seasons.

Context:
This is the third lesson in the unit. We have covered how clouds are formed and learned about the three types of clouds. Today we are going to learn about the steps of the water cycle.

Modifications:
Assistive technology will be used throughout the lesson. Refer to the assistive technology resources table for a list of the technologies that are used.

Resources:
Digital Camera
Beads- clear, dark blue, yellow, and light blue
String
http://www.first-school.ws/activities/science/drippy.htm
Harcourt Science Big Book-Unit D

Cotton balls
Cups
Cold water

Procedures:

20) Essential Question: How are we drinking the water the dinosaurs drank?
21) Real Life Connection- I know that several of you love to learn about dinosaurs. We already know that we are walking on the same earth they walked on and sharing the same land and sky. Did you know that we are also drinking the same water they drunk? Today we are going to learn how that is possible.
22) Introduce the water cycle by the Drippy the Raindrop story on http://www.first-school.ws/activities/science/drippy.htm
23) Use the student textbook *Harcourt Science* and talk about how clouds are tiny drops of water and when the drops join together they get heavy. When they get heavy, they fall as rain, sleet, hail, or snow. Rain in clouds activity:

    1. Give each child a cotton ball to hold. Tell them to pretend that they are holding a cloud.
    2. Ask them how does the cloud feel? heavy or light, soft or hard.
    3. Instruct the children to place the "cloud" (cotton ball) gently over the cold water. Explain that water that has evaporated has traveled up to the cloud and it is a lot colder up in the sky, so the vapor turns into water, and it is filling up the cloud. Ask: Can you see the "cloud" (cotton ball) filling up with the water.
    4. Ask the children to gently pick up the "cloud" (cotton ball) from the pan. Ask: How does the "cloud" feel now? Light or heavy. Warm or cold? What is happening with the water? (The water is dripping from the "cloud".) Why? (The cloud cannot hold all that water, is too, too, heavy.) What do we call when water falls from the clouds because they are too heavy with water? (rain) And what happens to the water? (It is coming right back into the pan, and the pan could be a stream, river, ocean or the ground.) The sun heats the water and it evaporates or rises back to the sky. When the water moves from the earth, to the sky, and then back again, it's the water cycle.
24) Create a flow chart on the white board about the water cycle as we are doing the lesson.
25) Introduce the water cycle song. (Sung to the tune of She'll Be Coming Around the Mountain)

The Water Cycle Song

Water travels in a cycle,
Yes it does!
Water travels in a cycle,
Yes it does!
It goes up as evaporation
Forms clouds as condensation
Falls as precipitation
Yes it does!

26) Use the website www.brainpop.com and view the water cycle movie. As a whole group we will take the quiz at the end of the video.
27) Use learning centers to evaluate students' ability to show or demonstrate understanding of the water cycle.

      a) Create a bracelet showing the order of the water cycle process. (clear bead-cloud and condensation, dark blue bead- water, yellow bead-sun, light blue bead-evaporation)
      b) Write or type the order of the water cycle
      c) Draw the water cycle by hand or though computer generation
      d) Orally record the steps of the water cycle

Assessment:

Formative
I will observe the student responses during the flow chart activity to see what students comprehend the water cycle process. I will use this information to develop new strategies if needed on how to teach the process.

Summative
 Students will be assessed on their knowledge of the water cycle by completing one of the learning centers. Each part is worth 10 points
All four steps are in the correct order- 40 pts
2 steps in order   30 pts
1 step in order   20 pts.
0 steps in order   0 pts.

Recommendations to Support Movement Toward Universal Design

As I stated earlier, my district needs to implement the principles of universal design. Our building does not have many accessible features. The elementary classrooms are on the top level of the building. There is one elevator that only functions occasionally. The doorways are very narrow. We have one student that uses a wheelchair sometimes and it is very hard for her to maneuver down the narrow halls and doorways. There are no Braille markers on any of the doors and no signs directing visitors through the building. There is one wheelchair ramp in the entire building. We are getting ready to undergo renovations on the primary wing of the building. Hopefully they have taken some of these design needs into consideration.

There needs to be policy changes at the district level. Currently the district has only assistive technology for one student. There needs to be assistive technology resources available at all times. If a new student enrolled in the district that had a disability other than blindness, there would be no technology readily available. The support technologies would have to be ordered. Students with learning disabilities and attention disorders are in nearly every classroom. The district needs to think about these students as well and get them the support they need.

I stated earlier that I am going to be doing a presentation for my fellow teachers at the beginning of the year. I also think a presentation needs to be made to the board of education. They may not even realize the disadvantage they are causing for the students.

Even though systemic change is not easy or cheap, it is something that needs to be considered in my district. I have included a template for creating systemic change in Appendix B. It outlines seven components and has a space for implementation examples.

This would be a great outline for the district to follow to begin systemic change. One of the major setbacks to such a change is lack of funding. I would like to being writing grants to get my school some of the assistive technology that we need. If others become involved in the process, funding would be found. If we could find funding at a school level, it might encourage the district to do so as well. They would know they have dedicated teachers who are willing to help in the process.

References

Duxbury Systems Inc. Retrieved June 13, 2007, from http://www.duxburysystems.com/

EnableMart Technology for Everyone. Retrieved June 18, 2007, from

http://www.enablemart.com

Kurzweil Educational Systems. Retrieved June 23, 2007, from

http://www.kurzweiledu.com/

Rose, D. H., & Meyer, A. (2002). *Teaching Every Student in the Digital Age: Universal*

Design for Learning. Alexandria, Virginia: Association for Supervision and

Curriculum Planning.