Telling Time: Educating on the Various Ways to Tell Time

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Introduction and Rationale

Over the past 9 years as an educator, I have noticed the same reoccurring challenge for students of all ages; telling time. Much of the confusion comes from "why is it dark at 6 p.m. now, but it will be light out at 6 p.m. in the summer?" Or questions on "why is there two times a day the number is the same?" Another great question students will ask is "what is a.m. and p.m.?" "How do I know what time of day is it when I am reading the clock?" "How do I read two different clocks?" "What is an analog or digital clock?" I have noticed that students are only seeing time digitally. This often causes confusion when presented with an analog clock or even the concept of time. According to the Common Core Standards, first graders are expected to tell and write time. With the Next Generation Science Standards students in grades K-2 are to make observations at different times of the year to relate to the amount of daylight to the time of the year. These two standards go hand in hand when understanding the concept of time. With these standards being required in first grade, it would make more sense to combine them, to help my students learn a topic that is abstract to their current stage in development. By second grade, these students are required to be able to tell time fluently.

I have asked myself time and time again how to make telling time easier for students of all ages. I will be writing a multi-approach curriculum unit that focuses on various approaches of telling time. Students will explore various ways of telling time, which include auditory, visual, and tactile approaches. I currently teach first grade special education with a general education co-teacher in an inclusion classroom. First grade students are exposed to learning how to tell time throughout the school year. They can often be seen practicing telling time or trying to tell time throughout the school year. This unit will use technology from various time periods to practice telling time.

School Profile and Course Specifics

The students in my school come from very diverse backgrounds. There is approximately 750 or more kindergarten through fifth Grade students in my school. Our school services student's from low socioeconomic status and receive free breakfast and lunch. As a first-grade special education teacher, I have about 11 students on my caseload and about 10 general education students in the classroom I co-teach in. More than 60% of my class is ELL students. First graders are ages 6 and 7 years old.

My students are often still learning basic math and phonics skill when they come into first grade. They are familiar with the Smartboard, small and whole group activities, and hands on activities. They enjoy working together any chance that they get. My goal for this unit is to have my students improve upon their knowledge and ability to read and understand time. This lesson will help my students not only understand a math concept that is required, but an important life skill that is needed. Today's students are exposed to time digitally every day without exposure to analog clocks. This major shift in telling time brings conflict in educating students the already difficult concept of telling time. Using a multi-approach curriculum will allow my students receive exposure and practice across the curriculum.

The Telling Time: Educating on The Various Ways to Tell Time unit not only uses the Common Core Standards for math, and the Next Generation Science Standards (NGSS). This is a cross curricular unit, that will help students practice throughout the day and the school year. The Common Core Standard CCSS.MATH.CONTENT.1.MD.B.3 expects students in first grade to be able to "Tell and write time in hours and half-hours using analog and digital clocks." The NGSS time standard is1-ESS1-2 Earth's Place in the Universe and if focuses on the various times of year. The exact standard is "Make observations at different times of year to relate the amount of daylight to the time of year." Both of these standards go hand in hand when teaching first graders to read time. They often need to connect the visual time change to the clock in order to understand the concept of time.

Content Objectives

This year, my focus will be on creating confident time readers. First graders need to be able to relate to a topic in order to understand it. Teaching time needs to be shown not only with hands on activities, but taught in intentional ways to connect their day to day schedules to time and how it shifts daily, and seasonally. First graders need to understand that the sun plays a role in telling time throughout the year. Students will work towards understanding the following essential questions: How can I tell what time of day it is by the sun? How do the seasons affect the time of day?, How do I read analog and digital clocks?, and How do I use a schedule to tell time of day?

Students will be introduced to a brief history of time and clocks with hands on, and visual activities. Students will use a journal to create their daily schedule and record what it looks like outside during various seasons. Students will practice reading and writing time throughout the day, with digital and analog clocks. They will also discuss how their schedule can tell them what time of day it is.

Background Content

Student Background Knowledge

By the beginning of October in Delaware, students have been exposed to Bright Days, Dark Nights, which in that science unit, it collects time data on day's becoming shorter or longer every single day. Most students understand that clocks tell time, even if they do not understand the concept of time, nor do students know how to read an analog or digital clock. In the math curriculum in Christina School District, we use time during Number Corner (Bridges Calendar Curriculum), along with the regular curriculum throughout the school year. In the telling time unit, students learn about the basic principles of telling time such as how the sun is used to tell time, various ways of telling time while using an analog clock, a digital clock, and sundial. Students will also learn how to use time with a schedule on a daily basis.

Key Content

Basic Time Telling Concept

Students will need to understand the basic concept that the sun tells us time and that time (amount of day light) of day is affected by the seasons. At this point students discuss sunrise and sunset with the Unit Bright Days, Dark Nights, however they are looking up the times and graphing it. For many students this is extremely abstract since they are not physically seeing the changes at the exact time that the changes take place. For this reason the students will be working on this concept with their families at home along with reviewing it at school. Students will have a journal where they will keep a schedule during 4 given times a year. They will use this journal to keep track of their day to day routine, the time the do that routine item, and what it looks like outside based off of the sun. These days include the first day of fall, winter, spring, and a random day in May, since the students will not be in session during the first day of summer. They will have a discussion after each collection of time. These discussions will talk about what they noticed for that day, what was different previously (if applicable), and what they predict will happen next. At the end of the school year students will be able to discuss what they have learned, and what they have observed over the school year.

Sidereal Time and Solar Time

Many people do not realize that there are two main types of time; Sidereal Time and Solar Time. Universal Time is a solar time standard that reflects the average speed of the Earth's rotation.[1] The prime meridian (0* longitude) is used as a reference point for determining the solar day on Earth. This time is one solar noon to the next solar noon, which is a full rotation in relation to the Sun[2]. The time measured by the stars is called sidereal.[3] Sidereal time reflects the period it takes Earth to complete a full rotation around its axis in relation to a fixed object outside of Earth's orbit around the Sun[4]

Twenty-Four Hours in a Day

The day is broken into 24 hours or two groups of 12 hours (1-12). Our time of day is based off of sidereal time, which is how long it takes the Earth to rotate around the Sun. Noon is used as half way through the day, while midnight is the start of a new day. Noon is twelve hours after midnight. Noon is when the sun is at its highest peek in the sky. Analog clocks are made to have numbers 1-12 on it. This helps when telling time to have it broken down in 12 hours instead of 24. The number 12 is placed at the top of the clock for a very specific reason. Twelve is the halfway number of 24 in the 24-hour time period. It represents the start of the day (midnight or zero), or halfway of the day (12 out of 24 hours). Halfway through the day is noon. Putting zero up top would be confusing when it came to noon.

The abbreviations of AM and PM help differentiate the time of day. The first twelve hours of the day are the morning hours. The abbreviation of am is Latin for Ante meridiem or before noon.[5] The second twelve hours of the day abbreviation is PM, which stands for Post Meridiem or after noon.[6] These abbreviations help tell time of day if you are not using the 24 hour written time. For example: 1:00 am or 1:00 pm.

The 24-hour day comes from the ancient Egyptians who divided day-time into 10 hours they measured with devices such as shadow clocks, and added a twilight hour at the beginning and another one at the end of the day-time.[7] For the Ancient Egyptians night-time was divided in 12 hours, based on the observations of stars.[8] The Egyptians had a system of 36 star groups called 'decans' — chosen so that on any night one decan rose 40 minutes after the previous one.[9] They even created a table to help figure out what time it is at night.

Military Time

Military Time is based off of the 24-hour clock. Instead of splitting the times into 12 hours and using am or pm they us time like 1300 for 1:00 pm. The numbers run from 0-24. Starting at midnight numbers run from 0 to 24.[10] Many other countries use the 24-hour clock on a regular basis. Students in those countries are taught using the 24-hour clock or “military time.”

To read Military Time, you often subtract 12 from the numbers 13-2400. For example if it 1345 in military time you would set up the equation 1345-1200= 145 or 1:45 pm. Any number that is above 1300 is designated as pm. By using military time or the 24 hour day time, you eliminate the confusion of AM and PM.

Time Zones

Times zones are different than local time. The local time within a time zone is defined by its offset (difference) from Coordinated Universal Time (UTC), which is the world's time standard.[11] UTC times changes go forward or backward corresponding to a 1-hour difference in mean solar time for every 15 degrees east of west of the prime meridian (0* longitude) in Greenwich, London, United Kingdom.[12] It is often expressed as either UTC- or UTC- and the number of hours and minutes. [13]

Times zones are not so cut and dry if you look at a time zone map. You will often see a line go around states, countries and islands. This is to keep time zones consistent and not have towns or states where half are one time zone and the other half is another time zone. There is more that 24 time zones. Some of these time zones are by hours, and others are by 30 to 45 minutes due to the International Date Line. [14]

In 1883, Canadian and American Rail Roads started using four continental time zones to make train schedules easier.[15] There was often confusion since every local time was different based off of the local noon. It was the rail road companies in Canada and America that created more efficient time zones and time system versus' each countries government.

Metric Time & Decimal Time

Metric Time and Decimal time are very similar in concept, but have different units. When looking up Metric Time online, it is based around time intervals using base 10. For example 10 days in a week or 10 hours in a day. When researching decimal time, I found various scales for various decimal systems. There are different decimal systems for different time periods across history. One example of a different kind of decimal system I found online had to do with the Swiss watch company called Swatch. In 1998, the Swiss watch company Swatch introduced the concept of a decimal Internet Time in which the day is divided into 1000 'beats' so that each beat is equal to 1 minute 26.4 seconds.[16] The beats were denoted by the @ symbol, so that, for example, @250 denotes a time period equal to six hours.[17]

Telling Time at Night

Telling time at night once wasn't as easy as it is now. All you have to do is look at your phone or clock and you can see what time it is. However, back before clocks telling time was not as easy as we have it now. Many cultures used sand, charts, and even stars to tell time. If you lived in the northern hemisphere, you can use the Big Dipper and the North Star to tell what time it is.[18]

There is often confusion with midnight. Is it morning or night? Is it the start of a new day or the day before? When do you use am or pm? This confusion is why many people, company's and country's use the 24-hour or Military Time approach to help differentiate

between AM or PM. If you ever look at the red eye flights, they never come in at 0000 or 2400. They will always be 2359 or 0001. This not only cuts down on the AM or PM debate, but also helps people understand and plan. You wouldn't want your ride waiting on the wrong day to pick you up.

Gregorian Calendar and Leap Year

The Gregorian Calendar is the most widely used calendar in the world today.[19] It is also used as the international standard for representation of dates and times. This calendar is a solar calendar based on a 365-day common year divided into 12 months of irregular lengths.[20] 11 of the months have either 30 or 31 days, while the second month, February, has only 28 days during the common year.[21] Every four years is a leap year. This is when one extra day is added to February (29 days instead of 28 days). This makes the calendar 366 days instead of 365. A leap year is any year that can be divided by 4. The Gregorian calendar has 7 days in a week and 52 weeks. The international standard is to start the week on a Monday, however several countries, including the United States and Canada, count Sunday as the first day of the week. The Vatican, is the "birthplace" of the Gregorian calendar.[22] The Gregorian calendar is named after Pope Gregory XIII, but is an adaptation of a calendar designed by Luigi Lilio (also known as Aloysius Lilius).

The Gregorian calendar replaced the Julian calendar because it was not accurate enough. The more advanced leap year formula makes the Gregorian calendar far more accurate than the Julian, however it is not perfect.[23] Compared to the tropical year, it is only off by one day every 3236 years.[24] A tropical year can be explained as being measured from either the vernal or autumnal equinox to the next one, or from the summer or the winter solstice to the next one.[25]

Daylight Savings Time

Daylight Saving Time (DST) is the practice of setting the clocks forward 1 hour from standard time during the summer months, and back again in the fall, in order to make better use of natural day light.[26] Students, especially the elementary age students and younger, have a difficult time comprehending the times changes. This can be seen in daily routines. The most visible is the disruption in sleep routines, or the questions of "why is it night time?" or "why is it getting darker out?"

Lunar Calendar

The difference between the lunar calendar and the solar calendar is the celestial body used to measure the passage of time.[27] The lunar calendar uses the phases of the moon to measure time, usually measuring the time from new moon to new moon as one month.[28] A new moon occurs every 29.5 days.[29] Jewish and Muslim faith followers are some of

the many religions in the world that use the lunar calendar as well. The use of the Lunar Calendar helps with religious holidays and dates that go back to ancient times.

Technology to Tell Time

Students will be exposed to various types of technology to tell time of day. The first piece of technology will be Sundials. Sundials are an instrument to show the time of day by the shadow of a gnomon on a usually horizontal plate or on a cylindrical surface.[30]
Sundials can be traced all the way back to 1500 BCE and were once called shadow clocks in ancient Babylonian astronomy.[xxxi] Sundials were used until mechanical clocks became more efficient. Pope Sylvester II, is often credited with the invention of the mechanical clock, c. 996. [xxxii] The mechanical clock is very much like the analog clock. Then there is the digital clock. Most students can read a digital clock easier than an analog. However, they still struggle with the concept of time. There was a patent for a digital alarm clock that was registered by D.E Protzmann and others on October 23, 1956.[xxxiii]

The following pictures are examples of each type of clock.

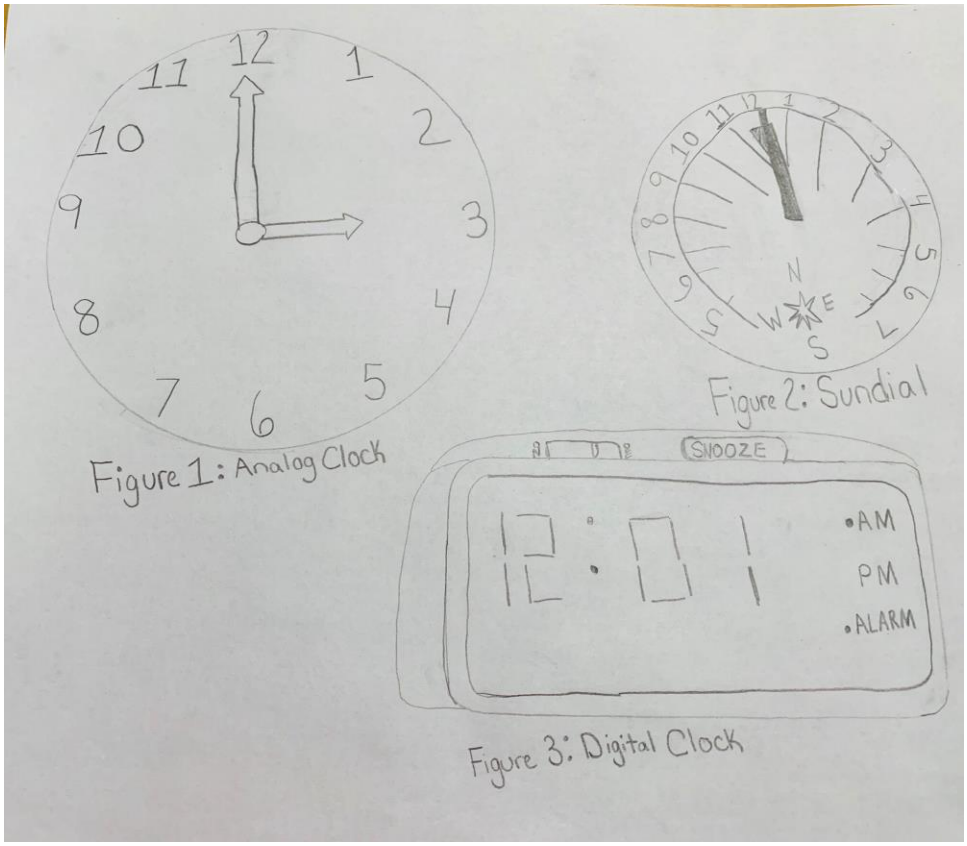

Figure 1: Types of Clocks Drawn by Cindel Berlin

Strategies

This unit will have a multi-content and curriculum incorporated in areas including mathematics and science. To successfully integrate these strategies and content into lessons that will be meaningful to students in telling and understanding time, students will use standards from National Generation Science Standards and Common Core Mathematics Standards. Students will engage in and use hands on activities, many multi-subject approaches, and use higher level thinking skills that will also encompass abstract thinking throughout their time in this unit.

Next Generation Science Standards
The Next Generation Science Standards are K-12 science content standards. These standards are set as expectations as for what students should know and be able to do.[xxxiv] These standards often guide teachers as to what should be taught in their grade level for science, along with what concepts students should be able to understand. These standards guide my activities and strategies in many ways. I wanted to make a unit, where the curriculum would be very hands on. This way it would be more concrete for my students, since at this age, telling and reading time is such an abstract concept for them. My unit will encompass the Next Generation Science Standards by being a school year long project.

Common Core Mathematics Standards
Many states in the United States follow the Common Core Standards. This unit uses the first grade time standard. This standard has helped guide my strategies and connect the two standards in many ways. Students struggle with telling and reading time. This unit will meet the time standard while connecting to the Next Generation Science Standards. I designed this unit for both standards to be taught at the same time. This way, the students can make the connection of how time and daylight helps tell time. This will hopefully help them understand the concept sooner.

Instructional Strategies

Hands on Activities

The first piece of technology your students will use is a sundial. They will create one as a class and use it several times throughout the school year to tell time during various seasons. The students will need to be taught why someone might use that time of clock to tell time and why they used it. The next piece of technology that needs to be discussed is analog clocks. Students will need to understand why people used that type of clock, how and why we still use analog clocks, how to read them. Using the hands on analog clock to practice reading the time and making time will help students connect to the concept of time. The final type of clock that is discussed will be a digital clock. Students will understand why they are used and how to read them. Each time a clock is introduced,

recap and discuss the previous clock. Compare and contrast each clock, and review the definitions of each clock along with a picture to go with each clock. Create a chart with each type of clock listed. Each time a clock is introduced write down what the students noticed and learned. Compare and contrast during discussions with the students. This chart will give them a better visual and way to remember each clock.

Cross-curricular approach

Students will do some of the activities during science and math. The journaling and journaling discussions will happen during science. This is a great time to have students imagine that they are scientists. Since science time is often less structured, making the sundial and use of the sundial will be during science. Also, during science, it is a great time to compare what time looks like on all three types of clocks.

During math students will be practicing telling, making, and reading time. This way student's are receiving practice throughout the day. Students will also be exposed to various texts in science and math, explaining the types of clocks. This not only helps build familiarity with the content, but also helps build vocabulary and content knowledge to your diverse learners. Students will also work on their writing skills while journaling.

Higher level thinking skills

Students will use higher level thinking skills, when connecting their schedules through the seasons. This way they can see that their schedule is still the same even though the length of sunlight has changed throughout the year. They will compare and contrast not only with the chart of the different clocks, but also with their schedules throughout the year and how the seasons affect their perception of time. Students will also have to think about and solve time using various methods and approaches during science and mathematics.

To extend some of the activities for your higher level students to create higher level thinking, once all three clocks and concepts have been taught. Take all three clocks outside during various season changes, and Daylight Savings Time, to discuss any observations or changes they noticed. Discuss why think the changes happened. Delve deeper if appropriate for your class.

When working with higher level students, challenge them to read and write time, every 10-15 minutes on a clock or worksheet. Once that is mastered, have them work on reading time using the 5's, then 1's.

Special Education Students and English Language Learners

Most classrooms across the United States have students who are either classified as Special Education or English Language Learners. As educators it is extremely important that we address these various learning differences from a general education population. Some teaching strategies you may need to incorporate if you haven't already is to pre-teach vocabulary. If possible, provide pictures (with labels), gestures, time to explore the materials while explain what is being used and why. Try labeling the different clocks by type of clock, and parts of the clock. If the material is too advanced, or your students are struggling, slow down and break the lesson over multiple days or weeks.

Label the classroom analog clock with the minutes (go by 5's) written out around the outside of the clock. This will give all of the students a better visual and understanding of the ticks. Try color-coding the minutes to match the minute's hand, and the hours to match the hour hand. Do not worry about the second's hand.

If your classroom does not have a visual daily schedule with the time written next to it, create one. We want our students to be comfortable seeing time and to practice reading it. This is a good strategy for students to receive exposure to the schedule more frequently. Make sure you discuss it when transitioning. This will make it more tangible for your students to understand. We keep our visual schedule in the front of the classroom near the door. This helps with transition with students who struggle with transitioning.

Classroom Activities

Seasonal Time Journals

The Seasonal Time Journals activity is a yearlong activity. Students will receive a journal at the beginning of the school year. They will take these journals home four times a year. The first time will be at the end of August or beginning of September (whichever aligns with your start of the school year). Create a chart for each season (with the month used) to write down their observations (overall observations). Include morning, midday, afternoon, evening, and bedtime (adjust depending on the area you live in).

During the first trip home, students will create a daily schedule with their parents from the time they wake up until the time they go to bed. It can be broad or very detailed. Students will make observations throughout the day about what it looks like based on the sun (ex. Dinner at 6; Sun is not as bright). Students will then bring their journals back. During science, discuss their observations about how a certain time of day looks due to the sun. Discuss why we have schedules and routines. Guide students in making the connection of how we can tell when we follow our schedule due to time of day and how it looks outside. Have students make predictions on what they think will happen in the next season. Record their predictions in journal or on chart paper.

Then when the season changes to fall (depending on the area you live, you may need to adjust by a week or two), have students take their journal home again. This may be in September or in October, which whichever will help your students see a change in daylight from their first observation. Students will take their journals home and they will copy their previous schedule for the fall season on another page. They will note their observations in their journal about daylight changes, if their schedule changed due to lack of daylight, or what it looked like outside while they continued their schedule. Students will then bring their journals back. Make sure you discuss their previous predictions before going into the next season discussion. This will help as a refresher to your students. During science, discuss their observations about how a certain time of day now looks due to the change with the season and the sun. Record their observations on the chart about the different times of day with the current season. Guide students in making the connection of any similarities or differences between the previous season and the current. Have students make predictions on what they think will happen in the next season. Record their predictions in journal or on chart paper.

Then when the season changes to winter (depending on the area you live, you may need to adjust by a week or two), have students take their journal home again. Have your students take their journals home and they will copy their previous schedule for the winter season on another page. They will note their observations in their journal about daylight changes, if their schedule changed due to lack of daylight, or what it looked like outside while they continued their schedule. Students will then bring their journals back to school. Make sure you discuss their previous predictions before going into the next season discussion. This will help as a refresher to your students. During science, discuss their observations about how a certain time of day now looks due to the change with the season and the sun. Record their observations on the chart about the different times of day with the current season. Guide students in making the connection of any similarities or differences between the previous seasons and the current one. Have students make predictions on what they think will happen in the next season. Record their predictions in journal or on chart paper.

The final journaling session will be in the spring. When the season changes to spring (depending on the area you live, you may need to adjust by a week or two), you will have students take their journal home one last time for this project. Have your students take their journals home and they will copy their previous schedule for the spring season on another page. They will note their observations in their journal about daylight changes, if their schedule changed due to any changes in daylight, or what it looked like outside while they continued their schedule. Students will then bring their journals back to school. Make sure you discuss their previous predictions before going into the next season discussion. This will help as a refresher to your students. During science, discuss their observations about how a certain time of day now looks due to the change with the season and the sun. Record their observations on the chart about the different times of day with the current season. Guide students in making the connection of any similarities

or differences between the previous seasons and the current one. Have students discuss predictions on what they think will happen in summer based off of their chart and observations for the year.

Book on Time

Find a book appropriate to your class's academic or developmental level. This book should include how to read time with an analog and a digital clock. If need be use several books to discuss both types of clocks. If you have a class that enjoys stories read a story on time and clocks when possible. Read these books when you start practicing reading digital and analog clocks. It can be spaced out or before each session. Some good books include *Telling Time* written by Jules Older and illustrated by Megan Halsey, *Telling Time with Big Mama Cat* by Dan Harper and Barry Moser, *Telling Time (Math World)* by Bridget Heos and Katya Longhi.

Sundial Activity

The initial Sundial Activity should take about 5 days to complete. The first day should be discussion on Sundials, and why they are used, along with exploring pictures of various sundials. If possible see if you can get a replica of a sundial for students to see and feel in person. The second day you will create a chart that you will use to compare sundials, analog and digital clocks. On your chart you will have on the top Sundials, Analog Clocks, and Digital Clocks. On the side have a row for benefits of that clock, difficulties of using that clock, and physical attributes. Have a group discussion on the benefits of using a sundial clock, what would be difficult using a sundial clock, and the physical attributes of it. Record these sections on the chart next to the corresponding topic. On day three the sundial creation activity will begin. There are many sundial templates online that can be printed on card stock. If you are feeling creative and time allows you can create a sundial using other materials other than card stock. I found making one for a class was efficient enough. I would modify the sundial to have regular numbers instead of Roman Numerals. This will make reading the sundial easier for all of your students. This is to be made a group activity, with discussions from the previous days to review vocabulary, and concepts. Once created (time and weather permitting) take the sundial outside with your students to explore the school property and sundial for the ideal location. Have them help come up with areas where the sundial should go on school property. Guide them if need be on why or why not the sundial should be in certain locations on school property. Once the best area is chosen, have students practice reading the sundial. Take students out at various times during day over the next few days to have them see how the sun and the sundial works together to tell what time of day it is. Make sure you are reviewing what has been previously discussed. Have students do a think, pair, share, or elbow partner discussions to discuss what they saw the time before, and what they think they will see the next time they go out to read the time on the sundial.

Practicing Reading Digital & Analog Clocks

This next activity will start out as a weeklong ongoing activity. It will then be reviewed periodically throughout the school year. Before each day, read a time book to your class. This will expose them to the vocabulary before the activity starts. On the first day of introducing analog clocks, you will need an analog clock you can manipulate. I would suggest a Judy Clock or an analog clock you can make changes to. Bring out the clock chart again. You will have students discuss the characteristics of the clock, the benefits of using it, and some challenges. Then discuss the parts of the analog clock. Have your students explore the clock (if you have a class set of analog clocks, have each student explore their own). Have students do a think, pair, share, or elbow partner discussions to discuss what they saw the time before, and what they think this analog clock will do. Then start a discussion comparing and contrasting the sundial and the analog clock. On day two review what was discussed and learned the day before. Have student's practice manipulating the analog clock and reading the time. On day three, take out the clock chart and a digital clock (make sure it is one you can easily manipulate). Have students explore the digital clock. Discuss and chart the observations they made. Next, practice reading time on a digital clock. Have students do a think, pair, share, or elbow partner discussions to discuss what they noticed about all three clocks.

On days four and five, start your group reviewing all three clocks. Then practice reading the same time on a digital and analog clock. As group have students use a worksheet where they are replicating the time seen on a digital and analog clock to match. Generally focus on the hour and half hour clock times to read. Provide an exit ticket of or activity to check for understanding on day 5. These activities can be spread out or quickened depending on your class's level of understanding.

Throughout the year add reading and telling time at the end of your math classes to keep your students practicing the concept and skill. This way you can still follow your curriculum map, but keep this skill going year round. This will help students who are struggling or would forget it. Provide an exit ticket or activity to check for understanding and retention of the skill.

Assessments

Summative

The summative assessment will be given at the end of the year. On the assessment make sure to include a portion where they have to write the clock hands in to match a time shown digitally, and vice versa. Also include multiple-choice questions about the season changes and how it looks at different times of the year. Have a review session after all activities are complete for the year.

Formative

Some formative assessments will be given periodically throughout the school after the initial lessons are taught. Formative assessments can be exit tickets, worksheets, or physical time reading tests. Create them based off of student developmental levels and what you were able to teach.

Endnotes

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[1] "What is Universal Time?"
[2] "What is Universal Time?"
[3] "What is Universal Time?"
[4] "What is Universal Time?"
[5] "What do AM and PM Stand For?"
[6] "What do AM and PM Stand For?"
[7] "Why Are There 24 Hours in a Day?"
[8] Why Are There 24 Hours in a Day?"
[9] Why Are There 24 Hours in a Day?"
[10] "Why Are There 24 Hours in a Day?"
[11] "What is a Time Zone?"
[12] "What is a Time Zone?"
[13] "What is a Time Zone?"
[14] "What is a Time Zone?"
[15] "Railroads Create the First Time Zones."
[16] "Why Are There 24 Hours in a Day?"
[17] Why Are There 24 Hours in a Day?"
[18] "Tell Time With Stars?"
[19] "The Gregorian Calendar"
[20] "The Gregorian Calendar"
[21] "The Gregorian Calendar"
[22] "The Gregorian Calendar"
[23] "The Gregorian Calendar"
[24] "The Gregorian Calendar"
[25] "How Long is a Tropical Year/Solar Year?"
[26] "What is Daylight Saving Time"
[27] "What is the Difference the Lunar Calendar & the Solar Calendar?"
[28] "What is the Difference the Lunar Calendar & the Solar Calendar?""
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Resources

Teacher Materials

- Markers
- Poster paper
- Judy Clock
- Digital Clock
- Sundial
- Card stock
- Sundial template
- Materials for sundial (if you’re being more creative)
- Scissors
- Glue
- Tape
- Notebook
- Journals
- Pencils
- Erasers

Children’s Books for Read-A-Loud

- *Telling Time* written by Jules Older and illustrated by Megan Halsey
- *Telling Time with Big Mama Cat* by Dan Harper and Barry Moser
- *Telling Time (Math World)* by Bridget Heos and Katya Longhi

Appendix 1

Common Core Mathematic Standard
Common Core Mathematic Standard CCSS.MATH.CONTENT.1.MD.B.3.
Tell and write time in hours and half-hours using analog and digital clocks.

Next Generation Science Standard

Next Generation Science Standard (NGSS) is 1-ESS1-2 Earth's Place in the Universe. Make observations at different times of year to relate the amount of daylight to the time of year.