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TE 804

# Curriculum Materials Analysis for Unit Plan

**Name of Curriculum Material:**

**Directions**

Curriculum materials are helpful places to start, but they are generally not perfect. What's more, even if the materials are very good, you'll still want to think about how to modify the materials to help your specific students learn. Use these tables, the I-AIM Model Handout, and the Curriculum Materials Evaluation and Unit Planning Cycle Table to complete an analysis of the curriculum materials you are using to plan your unit. This analysis should help you decide what modifications (e.g., in the activities and the order of activities) you want to make from the materials to what you actually teach. You should complete this analysis before you begin mapping out the instructional sequence for your unit.

You will consider your curriculum material as a whole as you complete this analysis. However, it will be helpful to think about which parts of the material to consider while you evaluate the material for different things. For example, you will want to look at the beginning of the material to see how good of a job it does at ENGAGE. You might want to look at the sections toward the end of the material to see if there are any apply activities/lessons to consider and evaluate.

After you complete the table, write a summary (about 2 double-spaced pages) of your analysis that includes:

1. The strengths of the curriculum materials (should be based on your analysis above).
2. The weaknesses of the curriculum materials (should be based on your analysis above).
3. How you are going to tie in your students intellectual and cultural resources in your planning and teaching?

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**Name of Curriculum Material**: Air Masses C. 2001 Produced by Michigan State University, East Lansing Public Schools, and Michigan Department of Education

**Using Learning Goal:** Explain weather patterns in terms of the movement of air masses. (V.3.M.1)
Explain the behavior of water in the atmosphere. (V.3.M.3.)

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| **Instructional Model** | | **Rate the material for each question below from the I-AIM Model**<br>1= low 5= high<br><br>Provide a rationale for why you gave this rating? Give specific examples. | **Rate the material for each question below related to knowing my students**<br>(consider intellectual and cultural resources and special needs)<br>1= low 5= high<br><br>Provide a rationale for why you gave this rating? Give specific examples. | **Modifications**<br><br>Based on your analysis related to the I-AIM model and knowing my students (and keeping the learning goals in mind), what modifications could you make to the activities in the materials (if necessary)? |
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| Engage | Establish a Problem | Is there a relevant, interesting, motivating, understandable problem/question that addresses the learning goal?<br><br>Rating: 5<br>Rationale/examples:<br>Each of the activities used in this unit includes a key question and or several other guiding questions throughout the lesson. These questions are comprehensible, relevant, and motivating. | Is this problem/question relevant and interesting to my students? Why/how?<br><br>Rating:5<br>Rationale/examples:<br>The key question/problem of the unit is to determine the cause of dramatic changes in weather. This may not be a topic they would think about/question on their own, but once they are posed with this question they will become quite curious and engaged to learn the causes of weather changes. | |
| | | | Will this problem connect to my students' lived experiences? Why/how?<br><br>Rating:5<br>Rationale/examples:<br>The problem relates to our students' lives | |

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| | | | because they are surrounded by the weather on a daily basis. Every student has experienced a drastic change in weather since it happen quite often here in Michigan. Even though our data is from several years ago, we can relate drastic weather changes to our students' lived experiences by bring up this weeks weather, in which we have had 2 snow days. | |
| | Elicit Student Ideas | Does the material elicit student ideas and help the teacher understand student ideas about the learning goal?<br><br>Rating:5<br>Rationale/examples:<br>Students are almost always asked open ended questions, which allow students to share their initial ideas about possible answers to questions. | What ideas do my students have related to this learning goal?<br><br>Rating:5<br>Rationale/examples:<br>We very briefly discussed the reason for seasons and the idea of evaporation in earlier units. Students have been exposed to weather units in previous grades. Therefore, students should have general knowledge on the topic of weather. They should be able to describe the daily weather. | |
| | | | Does this material allow me to build on these ideas? Why/how?<br><br>Rating:5<br>Rationale/examples:<br>When students are describing the weather, the teacher will bring up the property of weather they are describing. For instance, temperature, wind direction, wind speed, humidity, cloud cover, precipitation type and amount, and air pressure. The activities will provide the missing links for what causes the weather/properties to change from day to | |

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| | | | day. The activities cover what each property is and whether or not it is a cause in large changes in weather. | |

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| Explore & Investigate | Explore Phenom-ena | Do the students explore (have experiences with) a variety phenomena?<br><br>Rating:5<br>Rationale/examples:<br>The students' will have multiple experiences with exploring possible reasons why there was a rapid change in temperature between the 18th and 19th of the two week period we are studying. These include investigating "returning to winter" hypothesis, wind direction, could cover, temperatures in different locations, and the reported movement of 'fronts.' | Are these experiences likely to be relevant and interesting to my students? Why/how?<br><br>Rating:5<br>Rationale/examples:<br>We feel that all of the activities are interesting. They are also relevant since the hypotheses we are testing, are the ideas the students generated as a class. The activities are both hands-on and minds-on experiences. Students are able to construct and analyze many graphs and charts from the data they are given. The activities incorporate a variety of instructional approaches: whole group, small group, and individual work. | |
| | | Do the students collect data, record observations, look for patterns related to the learning goal?<br><br>Rating:5<br>Rationale/examples:<br>Throughout this entire unit students are collecting data, recording observations, and looking for patterns that cause a drastic change in weather. Students begin by collecting and charting the 'properties' of weather. They then graph the temperatures for the two-week period to identify the patterns. They notice there is a drastic change in temperature. They then use their data about wind direction, cloud cover, | Are these scientific practices likely to be relevant and interesting to my students? Why/how?<br><br>Rating:5<br>Rationale/examples:<br>The activities are relevant because students are collecting, recording observations, and looking for patterns in which they are generating their own conclusions. When students go through the scientific process the knowledge they gain is much more substantial and meaningful. These activities are building on scientific and mathematical skills. | |

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| | | temperatures in different locations, and the reported movement of 'fronts' to test the idea that the changing weather 'property' caused the observed temperature change. This is done by displaying the specific weather 'property' on the temperature graph and interpreting the data. | | |
| | Explore Student Ideas | Do the students explore & share their ideas?<br><br>Rating:5<br>Rationale/examples:<br>There are many opportunities for exploration and discussion. As I mentioned earlier, the activities incorporate a variety of instructional approaches: whole group, small group, and individual work. | Are these ways of knowledge-sharing familiar to my students? Why/how?<br><br>Rating:5<br>Rationale/examples:<br>Our students have had much experience with all three of these instructional approaches throughout all subject areas. As a result, this varied instruction is very familiar to the students. | |
| | | Does the material build on student ideas, challenge student ideas when necessary, and give students opportunities to revise their ideas based on evidence?<br><br>Rating:5<br>Rationale/examples:<br>After students have investigated and tested the many ideas of what caused the observed temperature change, the issue is raised again in light of the results of the investigations. Students are challenged to support their ideas with evidence from the investigations. | Does the material connect or take advantage of the types of experiences and funds of knowledge my students have? Why/how?<br><br>Rating:5<br>Rationale/examples:<br>This material and weather 'properties' we are studying connects directly to students' every day experiences with weather and how it affects their everyday lives. | |

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| Explain | Introduce Scientific Ideas | Does the material present scientific ideas related to the learning goal?<br><br>Rating:5<br>Rationale/examples:<br>The material presents many scientific ideas related to the learning goal. Specifically, the activities address the scientific processes (hypotheses, recording data, investigating patterns, recording/analyzing observation and using evidence to draw conclusions), the meaning of wind direction, and the concepts of air masses and fronts. | Will these scientific ideas/representations be understandable to my students? Why/how?<br><br>Rating:5<br>Rationale/examples:<br>The ideas and concepts will be understandable since they are explained in grade level appropriate language and the lessons are presented in step by step order to the students. It is key to give them enough information without giving them too much information so that they can understand how air masses and fronts work together to change weather. | Have the local weather team, meteorologist, send a letter to us about their job and their reasoning behind drastic weather changes. |
| | | Are the ideas represented effectively?<br><br>Rating:5<br>Rationale/examples:<br>We fell that all of the content and activities build on one another and connect fluidly. Additionally, they all relate back to our main learning goal. Effective representation includes weather reports, charts, graphs, weather instruments, models, and maps. | | |
| | | Does the material introduce new terms in the context where they are useful?<br><br>Rating:5<br>Rationale/examples:<br>In the curriculum material, new terms are both introduced and defined. Students are able to explore/make up definitions for concepts by using their own vocabulary while the teacher scaffolds their thinking towards the correct definition. This is done when appropriate/naturally during a lesson. | Are these terms going to be understandable and useable to my students? Why/how?<br><br>Rating:5<br>Rationale/examples:<br>The materials are useable because students were able to explore the materials before being given the definition. This allowed them to generate their “own” definition, which made it more meaningful to them (we scaffold their thinking to the right definition). | |

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| | Compare Student Ideas | Does the material provide opportunities for the students to compare new science ideas to their own previous ideas and note similarities and differences?<br><br>Rating:5<br>Rationale/examples:<br>Students are provided opportunities to compare new science ideas to their own previous ideas by noting similarities and differences. Students will form hypothesis about the reasons weather occurs and how it changes over time. After investigating, observing, and collecting data, they will then re-evaluate their hypothesis and compare the similarities and differences between what they though before and what they now believe is true. | Are these ways of knowledge-sharing familiar to my students? Why/how?<br><br>Rating:5<br>Rationale/examples:<br>The students have had frequent opportunities to hypothesis, investigate, and go back and compare/contrast their prior beliefs. They have done this previously in science so students are familiar with this process. | |
| | | Does the material include effective assessments related to the learning goal throughout and give the teacher opportunity to modify instruction based on assessments?<br><br>Rating:5<br>Rationale/examples:<br>Students are constantly being assessed through whole group, small group, pair-share, and individual work. Teachers are able to asses students knowledge on a daily basis so that they can adapt their teaching for the next days instruction. The assessments will be formal and informal. | Are these assessments likely to be understandable to my students? Why/how?<br><br>Rating:5<br>Rationale/examples:<br>These assessments have been practice throughout the year in all subject areas. In addition, the individual, written assessments are in student friendly terms and are easily understandable, which gives the students the opportunity to express the information they have learned. | |

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| Apply | Model, Coach, Fade | Does the material allow students to apply their new ideas to new situations related to the learning goal?<br><br>Rating:5<br>Rationale/examples:<br>The content and activities build upon one another, enabling students to apply their new ideas to new situations. The students will be asked to apply the idea of fronts to activities found on a local website in which students are asked to predict weather based on the previous days forecast. This is an animated program that help students apply their knowledge of weather changes and patterns to predicating weather changes and patterns. | Are these application situations relevant and interesting to my students? Why/how?<br><br>Rating:5<br>Rationale/examples:<br>The applications are definitely interesting and engaging because students will be able to test their knowledge by predicting weather changes on an animated web page. The activities are relevant because they correlate directly to our learning goal and to one of our students' pastimes, playing computer games. | |

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| | | Is support for student performance provided and gradually reduced<br><br>Rating:5<br>Rationale/examples:<br>We have supported our students throughout the whole learning process by letting them come up with a hypothesis for their reason why weather changes. Then collecting data and making observations together to further investigate our hypothesis. After collecting data students are then able to make generalizations about weather patterns and changes in which they can use this data to re-evaluate their hypothesis to make it accurate. Students are then tested by predicting the weather on an animated computer game so that we can see how their knowledge had changed and grown since the beginning of the unit. | Are my students set up to succeed? Why/how?<br><br>Rating:5<br>Rationale/examples:<br>As the curriculum stands, we feel the students would attain content knowledge. With appropriate modeling, proper introductions, and higher-level thinking questions, this is also going to increase the chances for student success. | |

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# Instructional Approach
# for
*Weather Unit*
*By: Christine Sherwood & Katie Beckett*

| No. | Activity Label | Activity Description | Activity Functions (Why this activity in this sequence?) |
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| 1 | Finding out about the weather (Lesson 1, Part 1) | Students identify various ways in which they could find out about the weather. If not brought up, the teacher introduces newspaper weather reports as one source. | Establish a Question: "What are some ways you could find out about today's weather?<br><br>Elicits Students' Initial Ideas: Elicits student's initial ideas about the question |
| 2 | Newspaper weather pages (Lesson 1, Part 2) | Students identify the various kinds of information available in the newspaper weather reports being used. The teacher models the term 'properties' to refer to the various aspects of weather described. | Elicits Students' Initial Ideas: Elicits student ideas and has student share ideas. Shows there are many 'properties' to describe weather. |
| 3 | Graphing temperature for two-week period (Lesson 2) | The teacher suggests investigating temperature as a way of understanding more about weather. The temperatures reported for each day during a two-week period are identified and displayed on a graph to make it easier to identify patterns. The period should include a large, rapid change. | Explore Phenomena for Patterns: Explore ideas about what causes these patterns. |
| 4 | Describing patterns of change (Lesson 3, Part 1) | The patterns revealed in the graph are described. The terms 'trend,' 'increase,' and 'decrease' are introduced to describe patterns. The large, rapid change between the 18$^{th}$ and 19$^{th}$ should be identified. | Explore Student Ideas About Patterns: Look for patterns in where temperature changes occur, especially the significant changes. |
| 5 | How would students explain sudden changes(s) in temperature? (Lesson 3, Part 2) | The teacher introduces the question, "What do you think caused the temperature to change so dramatically between Jan. 18 and Jan 19. Students' ideas about what caused the large, rapid temperature change are explored and discussed. The main alternatives should be listed and debated. | Establish a Question: Establishes a new, more focused question.<br><br>Students Explain Patterns: Have students explain possible reasons why there was a rapid change in temperature. |
| 6 | How to test the alternative ideas (Lesson 3, Part 3) | Students proposed and discuss ways of using the data available in the weather reports to test the alternative explanations. This will probably include investigating wind direction, cloud cover, temperatures in different locations and the reported movement of 'fronts.' | Explore Phenomena for Patterns: Students try out idea/hypotheses about sudden temperature changes. Develop conclusions from evidence. |
| 7 | Think about the "returning to winter" hypothesis (Lesson 4, Part 1) | Students consider whether the hypothesis "the large drop in temperature was due to a spring-like warming, followed by a return to winter" is sufficient for explaining the change in temperature. | Explore Phenomena for Patterns: Students try out idea/hypotheses about sudden temperature changes. Develop conclusions from evidence. |

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| 8 | Investigate patterns of change in cloud cover (Lesson 4, Part 2) | The class uses information about cloud cover to test the idea that changing cloud cover caused the observed temperature change. Data is displayed on the temperature graph. The class discusses the interpretation of the data. | Explore Phenomena for Patterns: Students try out idea/hypotheses about sudden temperature changes. Develop conclusions from evidence. |
| 9 | Investigate patterns of change in wind direction (Lesson 4, Part 3) | Students obtain information about wind direction from newspaper weather report for the two-week period and display it on the temperature graph to test the idea that changing wind direction caused the observed change in temperature. Students discuss the interpretation of the data and prepare a brief report. | Explore Phenomena for Patterns: Students try out idea/hypotheses about sudden temperature changes. Develop conclusions from evidence. |
| 10 | Investigate patterns of temperature change in locations (Lesson 5) | Students obtain information about temperature of another location(s) to test the idea that air moving form one place to another caused the observed temperature change. Data is displayed on the temperature graph in a different color. Students discuss the interpretation of the data and prepare a brief report. | Explore Phenomena for Patterns: Students try out idea/hypotheses about sudden temperature changes. Develop conclusions from evidence. |
| 11 | Investigate the pattern of movement of "fronts" (Lesson 6) | Students obtain information about movement of fronts for several days surrounding the rapid temperature decline, to test the idea that moving fronts caused the observed temperature change. Movement of fronts is displayed on a map labeled with the dates before and after the temperature change(s). Groups discuss the interpretation of the data and prepare a brief report. | Explore Phenomena for Patterns: Students try out idea/hypotheses about sudden temperature changes. Develop conclusions from evidence. |
| 12 | Explain the large change in temperature (Lesson 7) | The issue of what caused the large, rapid temperature is raised again in light of the results of the investigations. Students are challenged to support their ideas with evidence from the investigations. | Elicit Students' Initial Ideas: Elicits students' initial ideas about wind being moving air, air masses, and fronts.<br><br>Compare Student and Scientific Ideas: Students compare, test & revise their own explanations to answer the question. |
| 13 | Introduce the concept of air masses (Lesson 8, Part 1) | The concepts of air masses and fronts are introduced in a careful way. Students read and discuss paragraph and diagram. | Introduce Scientific Ideas: Introduce a scientific idea, the concept of fronts and air masses. |
| 14 | Animated computer simulation of predicting the weather. | Students will go to the website as directed it is here that they will navigate their way through today's weather and then make predictions for the following day's weather. | Apply to Near Contexts with Support: Students are predicting the tomorrow's weather based on what they learned about today's weather. Students use what they have learned about fronts and air masses to make these predictions by applying their knowledge of weather patterns to new experiences. |
| 15 | Making a model (Lesson 9) | Students choose among several short projects to show their | Apply with Fading Support: Use the idea of |

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| | | understanding of air masses and rapid temperature changes. | moving air masses and fronts to create a model that shows air masses moving across the country and how the temperature changes in different locations when the air masses move. |

- Describe the activity functions using I-AIM.

**Summary of Curriculum Materials Analysis:**

We evaluated and analyzed the Weather Unit by using the Inquiry Application Instruction Model. We found this unit to be laid out in a manner that follows the Inquiry Application Model, which allows students to recognize patterns, explore and investigate concepts, form explanations, and apply their new knowledge to new situations. It is here that students are able to establish questions, elicit initial ideas through hands-on experiences, explore and explain ideas about patterns, be introduced to scientific ideas which can then be used to form explanations of observations being made. After these explanations have been brought about, students can then apply their new knowledge.

While evaluating our sequence of instructional approach, we found it to follow the Inquiry Application Model as well. Mapping out each activities function, enable us to see that the teacher first establishes a questions which then elicits students initial ideas and sparks their interest in the subject of weather. Since weather is all around us and students can relate to this topic, students are engaged by being able to explore phenomena for patterns. More specifically, students are able to explore the patterns for what causes weather pattern. They are also able to try out ideas/hypotheses about sudden temperature changes. It is here that students then develop conclusions from the evidence.

Students are given the multiple opportunities to explore different phenomena by collecting data, observing, researching, and investigating. Students will then revisit their initial hypotheses and re-evaluate it in accordance to their new found “theories” of weather and its changes. They will then use this new found knowledge to apply to new situations, specifically challenging them on an animated computer program that allows them to test their knowledge by predicting the weather. In addition, they will also be creating a model of air masses. These final assessments are allowing the students to apply their knowledge that they have been learning about throughout the unit.