**Design for Instruction**

**TCWS Standards**

*•The teacher candidate designs instruction for specific learning goals, individual student characteristics, and learning contexts.*

*•The teacher sets significant, challenging, varied and appropriate Learning Goals.*

*•The teacher candidate will recognize that there are multiple assessment approaches that must be aligned**with Learning Goals to assess student learning before, during and after instruction. An attempt is made by the teacher candidate to design student assessments.*

**Lesson 1 Topic Title: The Secret Messages of Light and Color**

**Lesson 1 Learning Goals:** Define what you expect students to know and be able to do at the end of the lesson. The learning goals should be specific, observable, challenging and varied. Learning goals should describe what your students will learn and be able to do by the end of the lesson, and not simply what activities they will do during the lesson.

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| Learning Goal 1: 8th grade students will describe how the filters change color, with participation of 90%.Learning Goal 2: 8th grade students, given various color combinations of light, will be able to predict the final color observed by the brain with an accuracy of 80%. |

**Alignment of Learning Goals to State or National Curriculum Standards:** Describe how your learning goals align with the Iowa Core Curriculum and/or National Standards for your content area. Identify the general subject area, grade level, and one or more specific standards in your response. The Iowa Core Curriculum can be found at: <http://educateiowa.gov/index.php?option=com_content&view=article&id=2485&Itemid=4602>

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| Iowa Core Standard for Learning Goal 1: Inquiry Standard, Grades 5-8, Design and conduct different kinds of scientific investigations.Iowa Core Standard for Learning Goal 1&2: Physical Science Content Standard, Grades 5-8, Light interacts with matter by transmission (including refraction), absorption, or scattering (including reflection). To see an object, light from that object- emitted by or scattered from it- must enter the eye. |

**Justification of Learning Goals:** Explain how your learning goals are relevant, challenging, and appropriate. Consider their importance relative to previous and succeeding topics covered in the class, the students’ future in the class and school, and to skills needed for success in the 21st century world.

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| The lesson, Secret Messages of Light and Color, was appropriate for both my learning goals, which aligned with the Iowa core curriculum for grades 6-8. This lesson was important to my students’ learning because light is part of everyday life. My students will benefit from this lesson because the knowledge gained from the activity will be applicable in future art and high school physics classes. My students were also challenged in the lesson, by the second learning goal that required higher order thinking and overcoming misconceptions about color mixing of paint and light colors. My students used 21st century skills by observing throughout the exploratory lesson, using the computer simulation for mixing light color, communicating with other students through messages, and answering questions I asked.  |

**Assessment Plan:** Describe your plan for assessing your learning goals.

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| **Type of Assessments**Below, describe the method/s to check on student progress. Consider these approaches:**selected response**, e.g. multiple choice, matching, fill-in the blank questions**writing assessment**, e.g. essays, essay questions, journaling**performance-based assessment**, e.g. throwing a ball, presentation**teacher / student communication**, e.g. class discussion, interview, group work | **Assessment Sample Size**Below, list your assessment sample size. An assessment sample refers to the amount of student work you will assess. Teachers often make inferences about student learning based on a sample of only a few students’ work. Examples of assessment samples would include choral responses from the entire class, your observations of a small group performing a learning task, or an analysis of individual student writing, drawing or other performances. |
| Learning Goal 1-Assessment Method: I used various formative assessments during my first part of the lesson. I asked my students to hold messages they wrote with different colored inks against 3-D blue and red filter lenses and investigate what happens. My students were assessed through oral communication when I asked questions about what they were discovering in the exploratory activity. I also assessed on the basis of their participation in the activity. Learning Goal 2-Assessment Method: I used various forms of formative assessment in the second part of my lesson. I wanted my students to use their inquiry skills and knowledge gained from the first part of the lesson to develop predictions of what would happen when different light colors were combined. My assessments took place in a whole class setting. I assessed my students by questioning students’ logic behind their predictions and observed their participation and contribution in the large class discussion.  | Learning Goal 1-Assessment Sample: To assess participation in the first part of the lesson, I observed which students were creating notes and looking at the color changes through the filter lenses and which students did not. While my students were working, I walked around and asked explorative questions and predictions.I asked my students to explain why certain reactions happened. For example, I asked questions regarding what happened when white paper was not used to read the message or why the blue background or blue marker affected the viewing. After my students explored and made their observations, I brought them together as a whole class to discuss what they discovered. I asked questions including: How did you decode the message? What did you do? Did the colors of the words change under each lens? If so, what did they change to and why? Most questions were designed to challenge my students to use 21st century and critical thinking skills.Learning Goal 2-Assessment Sample: For the second part of the lesson I created a worksheet to assess my students’ exploratory, inquiry, and observation skills. My students had to apply previous knowledge of lights and optics with what they learned from part one of the lesson to predict the various combination light colors. My questions ranged from direct application to critical thinking questions. Inquiries included: what color do you see when you mix red light with green light, what are the differences between mixing lights colors and mixing paint colors, and how do you think light colors are able to combine together to create certain colors? After the lesson was over, I collected the worksheets. I was able to asses my students using the worksheet, and my observations of student participation to see who put forth effort throughout the lesson plan and who did not.  |

**Lesson 1 Plan:** Describe your plan for achieving your learning goals. The lesson plan should include the following sections: Analysis of pre-assessment data; Plan for differentiation; Plan to motivate learning and engage attentiveness; Description of activities to achieve learning goals; and Description of materials needed to implement lesson plan. **You may insert your lesson plan 1 responses in the provided prompts below or attach as a separate document in Appendix A. If you choose to attach a separate document, make sure that it still addresses all five sections below.**

**Analysis of Pre-Assessment Data:** Discuss what students already know and can do regarding your goals before you began your lesson. Pre-assessments may include your PLS instructor’s descriptions of past assessments and activities and/or your own observations from previous class activities or student work samples.

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| Although this lesson was an exploratory learning experience, my students had pre-existing ideas regarding what happens when your eyes view light and color. In previous lessons, my students learned about light waves and how they work, how light is absorbed and reflected off different surfaces, and how the light spectrum affects our eyes. These activities gave my students some brief knowledge about light and its affects. My students were supposed to apply their prior knowledge to my lesson plan. For example, without knowing that light can be absorbed or reflected would not have allowed students to understand the relationship between color filters and the messages, resulting in my learning goal not being achieved. In the second part of the activity, my students applied past learning experiences about how to mix paint colors and a brief idea on how the visible light is formed through the spectrum. Combining this information helped them predict and investigate the various mixtures light colors. The previous information, my students knew through observations, helped me create a lesson that shed insight on the misconception that mixing paint colors and light colors are the same, when in fact they are not.  |

**Plan for Differentiation:** Describe at least one way you will differentiate the content, process, or product involved in your lesson in response to individual student needs, preferences, prior knowledge, or interests. Consider especially the needs of students with disabilities, students who are high achievers in some area, students with language needs, and students who are at risk for school failure. For more information, see: <http://www.cast.org/publications/ncac/ncac_diffinstruc.html>

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| My plan for differentiation was implemented throughout my lesson. My mentor teacher helped me learn that there were not any students in my classroom with an IEP. However, it is important for me to recognize that not all my students learn in the same way. This is why it is critical for me to apply differentiated instructions in my lesson. I made an effort to include more than one learning style into my planning. My lesson was an exploratory lesson, which included inquiry and hands-on learning. The activity benefitted kinesthetic, visual, and auditory learners. Kinesthetic students had the opportunity to create messages and exchanging them with other students, using 3-D glasses to decode the message they received. Visual students learned the idea of the lesson through a simulation where they could use three different colors of light and observe what color the person on the simulation would see. After each part of the lesson was performed, I conducted a class discussion and asked questions regarding what the students learned, benefitting auditory learners. I also created critical thinking questions to challenge and enhance the rigor and relevance of the activity in my students’ learning process. |

**Plan to Motivate Learning and Engage Attentiveness**: Describe how you will motivate student learning at the beginning of the lesson. Describe specifically what you will say to introduce the lesson and engage students’ interest. Describe how you will maintain students’ interest throughout the lesson.

I presented my lesson on a Friday to an 8th grade science class. On Fridays, most middle school students are more excited about what is happening after school than during class. To counter this mentality, I used various instructional strategies to grab my students’ attention and focus from the beginning of class through the rest of the period. My attention grabber to start my lesson was singing the McDonalds’s slogan and having my students finish it. I then began my lesson by saying, “Good Afternoon Students. Did you ever wish you could write a secret message to someone but didn’t want anyone else to be able to decode it? Well today is your lucky day. Today, I am going to teach you how do just that.” Throughout the lesson I used proximity, names, and other classroom management techniques to manage my class. When my students started to get loud in the classroom, rather than using my voice, I used a clapping sequence that my students mimicked to cue to them that I needed the students to focus again so I could instruct the class. In the second part of my lesson, I gave my students enough transition time to grab their attention for the next part of the lesson using a humorous comment. Throughout the discussion of this lesson, I asked students to raise their hand quietly if they had something to say to reduce the amount of outbursts in the classroom.

**Description of Activities to Achieve Learning Goals:** Include descriptions of the activities you plan to use in the lesson. Your activities should be designed to support your learning goals and should be clearly described and carefully sequenced. Actively engaging students in learning also gives you the opportunity to assess their understanding. Make sure you take advantage of this opportunity by coordinating your activities with your assessment plan.

My lesson had two activities involved. Both of them were exploratory activities, which include observing and making predictions of how our eyes view light and color.

Activity one was based off of learning goal 1: 8th grade students will describe how the filters change color, with participation of 90%. This activity involved my students writing secret messages to their classmates using two different colored markers. Once messages were written, students used 3-D glasses with blue and red filters to observe what would happen when they looked through them. After my students were done investigating, I brought the class back together and asked them questions on what they discovered and observed. My students finished the discussion, cleaned up the supplies, and we moved on to the next activity in the lesson.

Activity two was based off of learning goal 2: 8th grade students, given various color combinations of light, will predict the final color observed by the brain with an accuracy of 80%. In this part of lesson my students were given a worksheet with different questions about predicting what different light color combinations result in. For example, they tried mixing red and green light together, to find what color would result from the mixing. When the students finished writing out their predictions on the worksheet, as a class, we used the PhEt Color Vision simulation, <http://phet.colorado.edu/en/simulation/color-vision>, to investigate if the predictions they made were correct. To ensure understanding of the activity, I would ask students to raise a hand, and give me their predictions on combinations of light that they made on their worksheets. After we tried all the combinations of colored light that was presented from the worksheet, I asked my students various critical thinking questions to assess whether the exploratory activities helped them understand the misconception between mixing paints colors and lights colors. The questions I asked included: What are the differences between mixing lights colors and mixing paint colors? How do you think light colors are able to combine together and create certain colors?

**Description of Materials Needed to Implement Plan**: List of all the materials or technology you will need to implement the activities.

* Markers
* White paper
* Color paper
* 3-D blue and red lens
* Worksheet
* PhET simulation: Color Vision
* LCD project
* Computer

**Section 2: Reflection on Lesson 1 and Planning Lesson 2**

**Instructional Decision Making**

TCWS Standard

*•The teacher* analyze*s student learning to make instructional decisions*

Students’ Response to Lesson 1: **Did the students respond in the ways you had predicted? Were you successful in accomplishing your learning goals for this lesson? Explain why you were or were not successful. Consider motivation, management, understanding of instructions, complexity of task, and differences in students’ achievement levels when constructing your answer.**

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| I felt this lesson was successful. This lesson was meant to have my students explore how light and color work, while also bringing attention to the misconception that mixing paint colors and light colors is not the same. By the end of the second part of my lesson, students were able to get a brief grasp about the concept of mixing light color together. My students were motivated throughout the lesson because they were able to do something that interested them, while having close interactions with classmates. Overall my students were under control and I was able to teach in a productive setting. My students still had the ability to be themselves and use their creativity while learning. I was able to use proximity, and attention grabbers, such as singing slogans of restaurants and having my students’ respond to them, to manage my classroom. This activity was exploratory, so complexity of this task was high in rigor and relevance. While my students participated in this exploratory lesson, they were able to apply what they learned from previous lesson, using intrinsic efforts to motivate them to learn from the new lesson.  |

**Adjustments for Lesson 2:** Describe how you will adjust your second lesson in response to your analysis above. Consider instructional strategies, the organization and content of the lesson, motivational strategies, preventative management strategies, procedural changes, materials, activities and assessment. Explain why you believe these adjustments will improve students’ learning.

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| The Secret Messages of Light and Color lesson was created as an exploratory activity, performed once as an introduction to learning in greater detail about the relationship between light and optics. If I were to use this lesson as an exploratory activity in future teaching, I would have minor changes to this lesson. Instead of using markers to write out the secret messages, I would provide color pencils and crayons for a better result. I would also take more time to describe what I wanted my students to write on the prediction worksheet for the PhEt simulation. I would also consider having the students participate on their own, through 1:1 mobile, and experience the simulation that way. If I were to further this lesson on mixing light colors together, I would explain why light colors mix the way they do. I would use critical thinking questions and explanations to create a discussion on how this affects their lives. My management style was successful and I feel the activities I provided my students lent itself to my teaching style that brought humor, attention, and memorable concepts to my students’ learning experience. |