



Field Version of UMF Unit-Wide Lesson Plan Template

Name: Rachel Yorke		Program: Secondary Ed	Course: 460
Lesson Topic/Title: Scatter Plot Analysis and Line of Best Fit			
Lesson Date: 3/15	Lesson Length: 2 days	Grade/Age: 8th	
Learning Objectives (Targets): Students will know that straight lines can be used to analyze scatter plots in their context. Students will be able to draw the line of best fit for bivariate quantitative data in a scatter plot. Students will be able to interpret the line of best fit in context of their data sets.			
Content Standards: CCSS.MATH.CONTENT.8.SP.A.2 Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.		Content Standards Alignment & Justification: Students will be examining scatter plots and using a method for informally inserting the line of best fit. Students will then interpret the line in context of the data to better interpret the relationship. Students will also use the line to more accurately interpolate and extrapolate values.	

<p>Assessment:</p> <ul style="list-style-type: none"> □ Pre □ Formative: Students will pair up and take turns drawing a scatter plot and having their partner informally draw the line of best fit. Students will also be using a web-based application to construct a scatter plot, guess the line of best fit, and compare it to the actual line of best fit. Students will also be responding to a prompt in their math journals which will help me gauge their understanding for the unit. □ Summative: Students will be making a slideshow about 2 related sets of quantitative data. Students will find the data, put it in a table, make a scatter plot of it, insert a line of best fit, and analyze their results in context of the data. Students will also take a summative assessment similar to their pre-assessment. □ Student Self: Students will grade their performance with a rubric. Students will also compare their guess for line of best fit with the actual line of best fit. 	<p>Assessment (Data & Student Feedback):</p> <p>While students are in their pairs, I will monitor the room and assess how well students are inserting the line of best fit. I will do the same when students are using the web-based application. I will read and respond to students' journal entries. The prompt will be based on the students' overall understandings related to the unit thus far.</p> <p>Students will present their projects in small groups. I will walk around the room to ensure that students have completed the project and have key components. Students will share their projects with me to assess proficiency. The results of the summative assessment will help me gauge how well students have understood the unit and how well they have met the standard.</p> <p>After the presentations, students will use a rubric to self assess. I will use their rubric as a guide for when I assess their projects. For the line of best fit activity, students will assess their performance by judging how close their guess for line of best is to the actual line of best fit.</p>
<p>Integration of Other Content Areas: (If appropriate)</p> <p>English: Students will write in their math journals to wrap up the lesson. They will be asked to share how they feel about scatter plots and the unit in its entirety. It is used as an opportunity to reflect on the lesson and practice their writing skills. Writing in math also helps students improve problem solving skills and solidify their understandings.</p> <p>Students will also be using research methods to find reliable data. They will be required to cite their sources for the data.</p> <p>Instructional Strategies to Differentiate Whole Class Instruction:</p> <p>This lesson begins with direct, whole group instruction as it is a completely new topic for all of the students. Many of the students prefer to be shown the material before working directly with it, which is why this is a good lesson to use direct instruction. Then students work in pairs to solidify their understandings. Additionally, the line of best fit naturally caters to visual learners.</p>	

Modifications / Accommodations / Extensions For Individual Students with Identified Needs:

Modifications: No modifications necessary. Since this is new material for all of the students, it will be taught at a pace and a level that will be well understood by students, thus not requiring the lowering of standards.

Accommodations: There are a few students in each class who have ADHD. They sometimes have difficulty focusing and following directions. In the B group, students C, D, and B often need subtle reminders to stay on task. I typically will walk up to their desk and just tap it and that usually works. In the C group, students A and C also tend to get off track very easily. To accommodate these students, I will be explicit, yet simple and structured in my delivery of the content. The lesson also includes a technology based activity to vary the pace of the instruction which should help in keeping students' attention. Also in the B group, D has a hearing impairment. D has been moved to the front of the room so they can hear my instructions and follow the lesson easier. In the A group, student E has Tourette Syndrome. This student's biggest difficulty is with writing and completing tasks within the given time frame. To accommodate this, time frames for all of the tasks are flexible. If students do not complete something in class, they are allowed to complete the tasks later at their own pace. Students also have assigned seats to prevent anticipated behaviors and to easily refocus students who have difficulty with staying on task.

Extensions: For students who quickly understand line of best fit, we can have a discussion on its place in the real world or how to find the equation of a line of best fit to more accurately interpolate and extrapolate.

Technology Integration: (if appropriate)

Students will be using a web-based application from the National Council of Teachers of Mathematics that allows them to easily construct a scatter plot and informally insert the line of best fit. Once they have done that, they can easily compare their line of best fit with the actual line of best fit.

Materials and Resources for Lesson Plan Development

Notes

Projector

Project example

Student laptops

Whiteboards

Rubric

Assignment instructions

<http://illuminations.nctm.org/Activity.aspx?id=4186>

Teaching & Learning Sequence:

Day 1 (53 minutes):

Review scatter plots and correlation (5 minutes)

- * Show how to construct it
- * Review types of correlation and what they mean

Introduce line of best fit (15 minutes)

- * Discuss how we use the line of best fit
 - * Show process for informally inserting line of best fit using Smart Board
 - * Hit two or three points, get half of the data above the line and half below
- Whiteboard practice (15 minutes)

- * Students pair up
 - * One student draws a scatter plot with a correlation
 - * The other student draws the line of best fit for that scatter plot
 - * Students then change roles
- Students use web-based app for line of best fit (18 minutes)
- * Students make their own scatter plot
 - * They make a guess for the line of best fit
 - * They compare their guess to the actual line of best fit

Day 2 (53 minutes):

Continued practice with line of best fit (5 minutes)

Introduce project (20 minutes)

Give students time to find topics and begin project (28 minutes)

Content Knowledge Notes: *(if applicable/instructor discretion)*

How to insert line of best fit: Try to make the line go through at least two or three points, ensure half of the data is above the line and half of the data is below the line.

Common Core Teacher Standards (CCTS) Alignment & Justification (*Field/Student Teaching Only*)

Standard #5 Innovative Applications of Content

The teacher understands how to connect concepts and use differing perspectives to engage learners in critical/creative thinking and collaborative problem solving related to authentic local and global issues.

This standard explains my role in making connections between math and its place in the real world. Students should be challenged to view disciplines through multiple lenses and as a teacher, I must facilitate the opportunities that allow them to do so.

Description: For their summative assessment over scatter plots, students were required to find a topic of interest to them and investigate correlation between two sets of quantitative data related to that topic. They had to make a table of the data, create a scatter plot with it, insert a line of best fit, and analyze the correlation.

Performance 5 (b):

Engages learners in applying content knowledge to real world problems through the lens of interdisciplinary themes (e.g., financial literacy, environmental literacy)

Rationale: This project required students to choose topics outside of the typical realm of mathematics and engage with the content in a new way. They had to make the connection between scatter plots and quantitative data and its place in the real world. Many students chose "big" topics related to climate change and overpopulation which really got all of the students thinking about how we use math to examine modern day problems.

Standard #6 Assessment

The teacher understands and uses multiple methods of assessment to engage learners in their own growth, to document learner progress, and to guide the teacher's on-going planning and instruction.

This standard ensures that I vary my means for assessment as to reach all learners and capture the many ways that students can express their understanding. It also suggests that I must use the results of the assessment to better inform my practice.

Description: Students wrote in their math journals during the lesson and created/presented their summative projects using technology.

Performance 6 (i):

Continually seeks appropriate ways to employ technology to support assessment practice both to engage learners more fully and to assess and address learner needs.

Rationale: Using technology for students to demonstrate their knowledge changes the traditional pace of the math classroom. It gives them an opportunity to develop a meaningful understanding of the topic and connect it to a personal interest. Students were engaged in their own presentations and found interest in their peers' topics as well. The digital math journals, on top of being extremely beneficial to the students, have been the most important tools in informing my practice. The students have used the journals as an opportunity to be honest and open when it comes to asking questions and demonstrating their understanding. On top of giving me feedback, they show me what I still need to talk about in class to ensure that they understand the material.

Standard #10 Collaboration

The teacher seeks appropriate leadership roles and opportunities to take responsibility for student learning, to collaborate with learners, families, colleagues, other school professionals, and community members to ensure learner growth, and to advance the profession.

To me, this standard means that I must act as a leader and work with students, parents, colleagues, and the community to develop meaningful instruction that meets all students and engages them. I must also collaborate with other professionals to ensure that I am growing and learning as an educator.

Description: I worked with my mentor teacher to adjust the academic appropriateness of the line of best fit and the summative assessment so that students would have a clearer understanding and so that it would present less of a challenge to them.

Performance 10 (b):

Works with other school professionals to plan and jointly facilitate learning on how to meet diverse needs of learners.

Rationale: I consulted my mentor on several occasions to discuss the best approach for teaching the line of best fit and assessing students on scatter plots. Together we determined the best method for teaching line of best fit and adapted the presentations to meet students' understandings and fit into a short time frame.

Standard #11.2 Design and develop digital age learning experiences and assessments

Teachers design, develop, and evaluate authentic learning experiences and assessments incorporating contemporary tools and resources to maximize content learning in context and to develop the knowledge, skills, and attitudes identified in the Standards•S.

Technology is one of the most important parts of modern education. I must include it on a regular basis in my classroom and design lessons around the use of digital learning tools. The technology needs to redefine the material in a way that expands students' understandings.

Description: For their summative assessment over scatter plots, students were required to find a topic of interest to them and investigate correlation between two sets of quantitative data related to that topic. They used technology to conduct research, make a table of the data, create a scatter plot with it, and insert the line of best fit. The students also used technology to create a presentation that summarized their results.

Indicator (a):

Design or adapt relevant learning experiences that incorporate digital tools and resources to promote student learning and creativity

Rationale: All of the components of students' presentations were created digitally. They had choice in their topics and were allowed to be creative in the selection and creation of their product. The use of digital tools engaged students on a new level and allowed them to demonstrate their understandings through the use of technology.

Standard #11.5 Engage in Professional Growth and Leadership

Teachers continuously improve their professional practice, model lifelong learning, and exhibit leadership in their school and professional community by promoting and demonstrating effective use of digital tools and resources.

In this digital age, it is a responsibility as a teacher for me to promote the use of technology in my classroom and throughout the school.

Description: To explain inserting the line of best fit, I used the Smart Board to visually demonstrate how to place the line, while also showing how to manipulate it to better fit my data. Students were encouraged to use the Smart Board to practice this skill.

Indicator (b):

Exhibit leadership by demonstrating a vision of technology infusion, participating in shared decision making and community building, and developing leadership and technology skills of others.

Rationale: Many teachers throughout the school use their Smart Boards as only a means for projecting information. Since I have the SMART capabilities on my laptop, students and myself were able to use the features of the board that allow us to manipulate the line. This takes the learning to the next level since students are directly engaged with the material. This demonstrated appropriate integration of technology that redefined how students understood the concepts.

Post-Lesson Reflection:

This lesson went well and all of the students were able to immediately visualize the line of best fit. They used it appropriately to interpolate and extrapolate values. I am glad that I decided to use an informal method for inserting the line of best fit because otherwise, it would have taken much longer to get through the unit and it would not have helped students in meeting the standard.

Students took a special interest in their summative projects, all which turned out very well. Many students chose topics of interest to them and were invested in finding the patterns and relationships within their topic.

The most difficult part of this lesson was helping students choose topics that had readily available data online. Many students had great ideas, but due to the information available, they had to change their topics several times. Also, some students did not quite understand that they had to find two quantitative variables within their topic to compare. This led to students trying to create scatter plots with qualitative variables, such as years or team names. This showed me that I should have spent more time going over scatter plots and what is needed to construct them.

If I were to change anything about this lesson I would have given students more time to do their projects. Students in the C groups felt pressed for time and it showed in the quality of their presentations. I also should have been more explicit in what I was looking for.

Overall, the lesson was successful and students did an excellent job of inserting the line of best fit and using it to interpolate and extrapolate data from scatter plots.