

Appendix Table 1: Overview of Lessons 1-8 Integrating the JEI Process

All lessons can be found on the [JEI Classroom Resources Website](#).

LESSONS	OVERVIEW
<p>1: Implementing a Peer Review and Collaborative Environment</p>	<p>OBJECTIVE: SWBAT (<i>students will be able to</i>) actively practice discourse in a constructive and respectful manner within a whole-group discussion via scaffolding utilizing Accountable Talk in order to stimulate higher-order thinking, promote tiered and reflective learning, and embed a model of respectful discourse.</p> <p>TIMEFRAME : Approximately 3-4 class periods; Class periods 2-4 should be review and practice.</p> <p>TARGET AUDIENCE: Middle/High school sophomore (Rigor can be increased for high school by decreasing embedded UDL strategies).</p> <p>OVERVIEW: In order for students to participate optimally in publishing, their science projects in JEI’s journal, an environment of mutual respect and trust has to be established. This prepares students for the constructive criticism/comments that are an integral part of the publishing experience. These are foundational in order for students to successfully navigate the Peer Review process.</p> <p><i>Accountable Talk is a structured model of classroom communication that requires the student community to utilize Claims, Reasoning and Evidence during classroom discourse. It consists of classroom conversation norms that fosters an environment of mutual respect and discussions stems/language tools necessary to build productive and rigorous academic discussion.</i></p> <p>PEDAGOGY:</p> <ul style="list-style-type: none"> ● The teacher will prep by affixing/taping Accountable Talk Stems (Supplement B)* and Accountability Reference sheet (Supplement E)* to student desks for student reference (posted Anchor Charts can also be utilized). In addition, the teacher will print out both the Accountable Talk Stems and Accountability Reference sheet for the class activity. ● The teacher should establish conversation expectations centered on respect by asking students to create a list about their expectations. The teacher will have students Turn and Talk prior to sharing with the whole-group. These student-created expectations should be prominently displayed in the class. ● The teacher will introduce a debatable Science/STEM topic. Students will practice using Accountable Talk stems in small groups (3-4 students) to debate the topic before having to participate during whole-group discussion to share out. ● The teacher should monitor the usage of Accountable Talk tenets and intentionally practice the use of the talking stems whenever small/whole group discussions occur. This should continue until it becomes a classroom daily habit.

	<ul style="list-style-type: none"> • The teacher should provide a self-reflective Exit Ticket to gauge student comfort with Accountable Talk. Teacher supports around Accountable Talk will lessen as student comfort and emotional safety increase. <p>*All supplements can be found embedded in the respective lesson plans at the JEl Classroom Resources Websites:</p>
<p>2: Scientific Methodology 101</p>	<p>OBJECTIVE: SWBAT identify the different parts of the Scientific Method utilizing real-life and science examples in order to establish the Scientific Method as a daily problem-solving tool.</p> <p>TIMEFRAME: Approximately 1-2 class periods</p> <p>TARGET AUDIENCE: Middle/High school sophomore (Rigor can be increased for high school by decreasing embedded UDL strategies).</p> <p>OVERVIEW: In order to teach the different parts of a journal manuscript, it is best to align the key parts to the Scientific Method. Ensuring that all students are well-versed in Scientific Methodology is a key support strategy that will assist in student’s mastering the different parts of a manuscript.</p> <p>PEDAGOGY:</p> <ul style="list-style-type: none"> • The teacher will share real-life, and science-based, examples and ask students to solve the issue utilizing the Scientific Method. Students will Turn and Talk with a partner for this activity. • After the students have shared during Whole-group Discussion, students should be placed in groups of 3-4 and each group should be provided a different problem that needs to be solved utilizing the Scientific Method. • Prior to beginning the activity, the teacher should ask students to share examples of constructive and destructive criticism. • The teacher will then assign roles (Leader, Advocate, Recorder and, if there are 4 students, an Observer). Assign each role extra-credit points that can be reduced if students are not fulfilling their roles. Rotate roles each time the group works on a group activity. The teacher should be facilitating by walking around to groups and observing interactions. • In order to informally introduce the Peer Review process, the teacher will swap each groups work with one another and each group will provide constructive feedback, inclusive of a explanation reflective on: <ul style="list-style-type: none"> a. Whether the group utilized the parts of the Scientific Method properly. b. The viability of the solution. • Each group will then reflect on the constructive criticism provided by the other group and reconcile their work prior to submission.

	<ul style="list-style-type: none"> • The students should take part in a “3-2-1” Exit Activity (3 things the students learned, 2 things they still wonder and 1 question that remains).
<p>3: Identifying Flaws in Experimental Designs</p>	<p>OBJECTIVE: SWBAT identify flaws in Experimental Designs</p> <p>TIMEFRAME: Approximately 1-2 class periods.</p> <p>TARGET AUDIENCE: Middle/High school sophomore (Rigor can be increased for high school by decreasing embedded UDL strategies).</p> <p>OVERVIEW: The goal of this lesson is for students to understand the importance of a well-designed experiment structure to the overall fidelity of the experiment. It will focus on students identifying flaws in experimental design scenarios so as to avoid similar pitfalls when designing their own experiments.</p> <p>PEDAGOGY:</p> <ul style="list-style-type: none"> • Prep: The teacher will create 6 stations with 1 experimental design scenario per station. Prepare extra credit question pile and place at each station. • Teacher will speak on the importance of designing an experiment that is well structured. Teacher should emphasize that a poorly structured experimental design will create a myriad of problems that will sabotage the entire experiment. Teacher will define the following terms: Independent Variables, Dependent Variables and Control and provide examples. • Teacher will provide Supplement B (Experimental Design Vocabulary worksheet)* to all students. Students will Turn and Talk and work on the activity in pairs. • Teacher will provide each group with whiteboards and all groups will display answers for each question respectively. Teacher will provide feedback on wrong answers. This is an opportunity to re-teach the misconception. • Teacher will provide Supplement C (Experimental Design Example)* to all students. Students will work independently on the activity. • Teacher will provide each student with a whiteboard and all students will display answers for each question respectively. Teacher will provide feedback on wrong answers. This is an opportunity to re-teach the misconception. • Students will partake in a Gallery Walk activity. Students will be in paired groups. The teacher will explain the logistics of a Gallery Walk: <ul style="list-style-type: none"> ○ Students will answer the questions at each lab station. ○ Students will keep the worksheets from each station in a folder.

	<ul style="list-style-type: none"> ○ Students will rotate between the stations until they have finished their rotation. The teacher will signal when to rotate. Students should only communicate with their partners. ○ The teacher will provide “extra-credit” questions at each station for those students who complete their station prior to the time to rotate. <ul style="list-style-type: none"> ● Students will define Independent Variable, Dependent Variable and Control as their Exit Ticket. ● Teacher should analyze the Exit ticket answers and utilize the beginning of the following class to answer questions whole-group. <p>*All supplements can be found embedded in the respective lesson plans at the JEI website</p>
<p>4: Aligning the Scientific Method to Parts of a Manuscript</p>	<p>OBJECTIVE: SWBAT align the parts of the Scientific Method to the parts of a Manuscript.</p> <p>TIMEFRAME: Approximately 1-2 class periods</p> <p>TARGET AUDIENCE: Middle/High school sophomore (Rigor can be increased for high school by decreasing embedded UDL strategies).</p> <p>OVERVIEW: Students will be introduced to JEI and the concept of journals. In addition, proper note-taking is foundational when writing a manuscript, and students should be well-versed in the Cornell Note Taking System. Students will also discover the different parts of a manuscript and begin to read JEI journal articles.</p> <p>PEDAGOGY:</p> <ul style="list-style-type: none"> ● The teacher will introduce the purpose of a journal and utilize JEI articles as key examples. The teacher will also teach the Cornell Note Taking System utilizing online resources. The class should practice this technique daily. ● After the teacher has divided students into groups of five, the teacher should introduce the Manuscript Discovery Organizer (Supplement B)* and a JEI journal article of their choice (online/hard-copy). ● Students will then partake in a Jigsaw activity and each student will be tasked with becoming an “expert” in their respective area (Summary, Introduction, Results, Discussions, and Methods). Once students have completed their assigned section, they will share their notes as they teach their group members. These notes should be kept in the students Science journal. ● During whole-group discussion, students will be asked to provide insights on each part of a manuscript. The teacher will then define the different parts of a manuscript via an interactive lecture in order to close any gaps in comprehension. ● Students will be tasked with finding a JEI article that interests them from the JEI website and complete the Introduction to Scientific Primary Literature activity worksheet.

	<ul style="list-style-type: none"> The students Exit Activity will be to list the parts of a Manuscript and align the Manuscript parts with the parts of the Scientific Method. <p>*All supplements can be found embedded in the respective lesson plans at the JEI Classroom Resources website</p>
<p>5: Deeper Exploration of a Manuscript</p>	<p>OBJECTIVE: SWBAT identify and explain the parts of a manuscript at a deeper and more comprehensive level.</p> <p>TIMEFRAME: Approximately 1-2 class periods.</p> <p>TARGET AUDIENCE: Middle/High school sophomore (Rigor can be increased for high school by decreasing embedded UDL strategies).</p> <p>OVERVIEW: Students will dive deeper into the different parts of a manuscript. This is essential for students who have never been exposed to journals/journal writing. Their exposure will be increased exponentially by outlining each part thoroughly. The Gallery Walk activity will be bookended with a Peer Review practice activity.</p> <p>PEDAGOGY:</p> <ul style="list-style-type: none"> Prep: The teacher will create 4 stations with 2 JEI articles per station, or 8 stations, to allow for groups of 2-3 students to move more freely between stations. The fifth station, the Peer Review station, will only include one article and a Peer Review rubric (Supplement F)*. The teacher will print out the respective JEI handouts for each station. Provide all students with a folder and all work will be kept in folder. Folder will be taken home only when all students have completed all stations. The Peer Review station should be finished as homework but students will work on the worksheet while at the station. Students will partake in a Gallery Walk activity. Students will be in paired groups. The teacher will explain the logistics of a Gallery Walk: <ul style="list-style-type: none"> Students will answer the questions at each lab station. Students will keep the worksheets from each station in a folder. Students will rotate between the stations until they have finished their rotation. The teacher will signal when to rotate. Students should only communicate with their partners. The teacher will provide “extra-credit” questions at each station for those students who complete their station prior to the time to rotate. Students who begin the Peer Review activity are expected to finish the work for homework and rotate accordingly. It is a comprehensive activity that will take more than the allotted time for the other stations. Students will rank the parts of the Manuscript easiest to hardest as an Exit Activity. Students will give brief explanation on the difficulties. Teacher should analyze the Exit ticket answers and utilize the beginning of the following class to answer questions whole-group.

	<p>*All supplements can be found embedded in the respective lesson plans at the JEI Classroom Resources website</p>
<p>6: Manuscript Assessment</p>	<p>OBJECTIVE: SWBAT demonstrate comprehension of the manuscript process via an assessment tool.</p> <p>TIMEFRAME: Approximately 1-2 class periods</p> <p>TARGET AUDIENCE: Middle/High school sophomore (Rigor can be increased for high school by decreasing embedded UDL strategies).</p> <p>OVERVIEW: This activity is a summative assessment that will provide the teacher with the data necessary to re-teach areas of student misconceptions.</p> <p>PEDAGOGY:</p> <ul style="list-style-type: none"> ● Prep: The teacher will make copies of <i>IRA/NCTE Research Paper Scaffold blank template</i> (Supplement A)* and <i>IRA/NCTE Example Student Research Paper sample</i> (Supplement B)*. ● Teacher will explain to students that they have to complete the Research Paper Scaffold utilizing the Sample Research Paper sample. This should be done under testing conditions. ● The teacher can decide whether to have students continue the assessment as homework due the following day (hybrid) or have the students continue the assessment the following day during class. <p>*All supplements can be found embedded in the respective lesson plans at the JEI Classroom Resources website</p>
<p>7: JEI Teacher Support - Bridge Lesson</p>	<p>OBJECTIVE: To support teachers prior to JEI manuscript submission</p> <p>TIMEFRAME: Dependent on time allotted for science projects respectively</p> <p>TARGET AUDIENCE: Middle/High school sophomore (Rigor can be increased for high school by decreasing embedded UDL strategies).</p> <p>OVERVIEW: The JEI resources are constructed to help support classroom instruction throughout the science project process, inclusive of final JEI manuscript submission.</p> <p>RESOURCES:</p> <p><u>Submission Guide Which includes information on the following:</u></p> <ul style="list-style-type: none"> ● Publishing with JEI ● Hypothesis-Driven Research ● Engineering-Based Projects ● Peer-review Process ● Manuscript Content ● Author Eligibility ● Writing a Scientific Manuscript ● Preparing for Submission

	<ul style="list-style-type: none"> ● Permissions and Licensing ● Submission FAQs
<p>8: PEER Review</p>	<p>OBJECTIVE: SWBAT explore various manuscripts and actively Peer Review manuscripts</p> <p>TIMEFRAME: Approximately 2-3 class periods</p> <p>TARGET AUDIENCE: Middle/High school sophomore (Rigor can be increased for high school by decreasing embedded UDL strategies).</p> <p>OVERVIEW: This activity will provide students the opportunity to Peer Review classmates work. Students will also be better prepared to respond to JEI correspondence by utilizing the constructive criticism to better prepare their manuscript for JEI submission.</p> <p>PEDAGOGY:</p> <ul style="list-style-type: none"> ● The teacher will introduce Peer Review as a method of both praise and constructive criticism. The teacher will remind students that the Accountable Talk tenets should be the backdrop for all of their comments in terms of respect. Teacher will then show the Peer Review overview video: ● The students will the Turn and Talk and they will discuss 5 key take-aways from the video. ● Students will share out the key parts of Peer Review during a whole-group share. Teacher will then introduce the <i>Describe-Evaluate-Suggest method</i>. Teacher will show the Eli Review video: ● The class will then discuss the Eli Review video whole-group and the teacher will close any gaps of understanding. ● Students will review the manuscript work of one or two of their classmates via Google Docs/hard copies. Teacher will pair students for sharing of manuscripts. Teacher will then provide an overview of expectations and structure: <ul style="list-style-type: none"> ○ Students have to offer a minimum of ten definite comments on their partners' documents using the comments/edit function in Google Docs or on the hard copy. ○ Students will utilize the Peer Review rubric (Supplement F)* to assess one another's work. ○ When the students are done assessing, each student should see a mix of compliment for what his or her

partner is doing well and constructive criticism to help him or her improve.

- Students will finish by utilizing their in-text comments and rubric to write a writing 1-2 paragraph(s) summarizing their feedback in a conversational manner.
 - Students should focus on the positive aspects of the draft, and then provide constructive feedback and suggestions on what could be improved or changed, following the Describe - Evaluate - Suggest framework.
 - Commenting only "great read" or similar, giving only critical comments, or commenting only on grammar, mechanics and spelling will result in deducted points.
 - Students will then receive their manuscript and work on revisions by utilizing the commentary provided by their peers.
- It is recommended that students do an additional round of PEER Review to ensure that all students are prepared for JEI manuscript submission.

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