*Figure 9.* Rubrics that are used to assess students’ understanding and skills throughout the lesson.

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| **Part 1. Rubric/Checklist**  3-Excellent, 2-Satisfactory, 1-Needs Improvement  Understanding of the content: \_\_\_\_\_\_  Quality of the answer : \_\_\_\_\_\_  Group Work : \_\_\_\_\_\_    **Part 2 Rubric**   |  |  |  |  | | --- | --- | --- | --- | | Criteria | Excellent  (3) | Satisfactory  (2) | Need Improvement  (1) | | Variables | All variables were correctly identified. | Most of the variables were correctly identified. | Few of the variables were correctly identified. | | Investigation | All variables were manipulated or controlled accurately.  Data collection was reliable. | Variables were manipulated or controlled accurately most of the time. Data collection was reliable. | Variables were manipulated or controlled incorrectly most of the time. Data collection was not reliable. | | Conclusion | Conclusion was well-articulated and explained how the most efficient design was determined. | Conclusion explained the final design as the efficient design but how it was selected wasn’t explained. | Conclusion did not clearly explain how the most efficient design was determined. | | Group Work | Group members worked together effectively. | Group members worked well together but some had more responsibilities than others. | Group members weren’t well-prepared to present together or were distracted during the investigation. |   Part 3 Rubric   |  |  |  |  | | --- | --- | --- | --- | | Criteria | Excellent  (3) | Satisfactory  (2) | Need Improvement  (1) | | Investigations | All variables were manipulated or controlled accurately.  Data collection was reliable. | Variables were manipulated or controlled accurately most of the time. Data collection was reliable. | Variables were manipulated or controlled incorrectly most of the time. Data collection was not reliable. | | Conclusion | Conclusions were well-articulated and final answer was justified with the findings. | Conclusions were based on the investigations, but final answer wasn’t clearly tied to the findings. | Conclusions were not well-stated and/or the final answer wasn’t based on the findings. | | Group Work | Group members worked together effectively. | Group members worked well together but some had more responsibilities than others. | Group members weren’t well-prepared to present together or were distracted during the investigation. |   Part 4 Rubric   |  |  |  |  | | --- | --- | --- | --- | | Criteria | Excellent  (3) | Satisfactory  (2) | Needs Improvement  (1) | | Strength of the Proposal | All arguments were supported by evidence gathered from the online and experimental investigations. | Arguments were mostly supported by the findings and the online investigations. | The arguments were not clearly supported by the online and/or experimental investigations. | | Clarity | Information provided and the proposal was very clear for stakeholders to make a decision. | Information provided and/or the proposal was somewhat clear for stakeholders to make a decision. | Neither Information provided nor the proposal was clear enough for stakeholders to make a decision. | | Use of Visual Media | The visual media was effectively used to present the ideas clearly and effectively. It was engaging and interactive. | The visual media used had interesting images, diagrams, charts, etc. but wasn’t engaging enough. | The visual media was not engaging nor was it interactive. | | Group Work | Group members worked together effectively to present their proposal. | Group members worked well together but some had more responsibilities than others. | Group members weren’t well-prepared to present together or were distracted during the presentation. | | Enthusiasm | Group members were very enthusiastic about their ideas and presented with great energy. | Group members were enthusiastic about the ideas but the presentation lacked energy. | Group members did not show any enthusiasm toward their presentation. |   Communal Goal Reflection Rubric   |  |  |  |  | | --- | --- | --- | --- | |  | Excellent  (3) | Satisfactory  (2) | Needs Improvement  (1) | | Quality and Clarity of Prosociality Aspect | Student developed informed understanding about how STEM fields and professionals help others.  AND  Student made clear connections by providing examples from the lesson and/or real life. | Student recognized how STEM fields and professionals help others.  AND  Student made connections that were too vague or not articulated strongly enough. | Student did not recognize how STEM fields and professionals help others.  OR  Student did not make any connections between communal goals and the lesson. | | Quality and Clarity of Collaboration Aspect | Student developed informed understanding that STEM is a collaborative endeavor.  AND  Student made clear connections by providing examples from the lesson and/or real life. | Student recognized that STEM is a collaborative endeavor.  AND  Student made connections to lesson or real life that were too vague or not articulated strongly enough. | Student did not recognize collaborative nature of STEM.  OR  Student did not make any connections between communal goals and the lesson or real life. | |