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Evaluation Results

Requirement : Natural Sciences: DHT Task 3

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DATE EVALUATED: 02/02/2019 09:57:27 AM (MST)

DRF TEMPLATE: Integrated Natural Sciences Applications (UG, C452, DHT1-0115)

PROGRAM: Integrated Natural Sciences Applications (UG, C452, DHT1-0115)

EVALUATION METHOD : Using Rubric

FINAL SCORE
Meets
Requirement

General comments:

2/2/19 - The submission describes an experiment to determine how the texture of a ball affects its bounce height, and an appropriate sequence of events and process of data collection are described for obtaining quantitative data. In particular, the bounce heights of the balls were captured by video recording each bounce so that they could be accurately measured in meters. The drop heights for the balls were kept the same for all tests and are accurately identified as a controlled variable. The conclusion precisely explains that finding similar results when replicating an experiment validates the results and finding different results would invalidate the results.

Detailed Results

(Rubric used : DHT Task 3)

ARTICULATION OF RESPONSE (CLARITY, ORGANIZATION, MECHANICS)

0. UNSATISFACTORY

The candidate provides unsatisfactory articulation of

1. DOES NOT MEET STANDARD

The candidate provides weak articulation of response.

2. MINIMALLY COMPETENT

The candidate provides limited articulation of response.

3. COMPETENT

The candidate provides adequate articulation of

4. HIGHLY COMPETENT

The candidate provides substantial articulation of

response.

response.

response.

CRITERION SCORE :

3.00

A. PROJECT DESIGN PLAN

0. UNSATISFACTORY

The candidate does not provide an explanation of the significance of the given factors in the project design plan.

1. DOES NOT MEET STANDARD

The candidate provides an explanation of the given factors in the project design plan with no detail.

2. MINIMALLY COMPETENT

The candidate provides an explanation of the given factors in the project design plan with limited detail.

3. COMPETENT

The candidate provides an explanation of the given factors in the project design plan with adequate detail.

4. HIGHLY COMPETENT

The candidate provides an explanation of the given factors in the project design plan with substantial detail.

CRITERION SCORE :

3.00

A1. LITERATURE REVIEW

0. UNSATISFACTORY

The candidate does not provide a logical summary of information from at least 2 sources that relate to the candidate's topic and experiment

1. DOES NOT MEET STANDARD

The candidate provides a logical summary with no detail of information from at least 2 sources that

2. MINIMALLY COMPETENT

The candidate provides a logical summary with limited detail of information from at least 2 sources that

3. COMPETENT

The candidate provides a logical summary with adequate detail of information from at least 2 sources that

4. HIGHLY COMPETENT

The candidate provides a logical summary with substantial detail of information from at least 2 sources that

design, hypothesis formation, or data analysis, and/or provide the foundation for the experiment.

relate to the candidate's topic and experiment design, hypothesis formation, or data analysis, and/or provide the foundation for the experiment.

relate to the candidate's topic and experiment design, hypothesis formation, or data analysis, and/or provide the foundation for the experiment.

relate to the candidate's topic and experiment design, hypothesis formation, or data analysis, and/or provide the foundation for the experiment.

relate to the candidate's topic and experiment design, hypothesis formation, or data analysis, and/or provide the foundation for the experiment.

CRITERION SCORE :

3.00

A2A. EXPERIMENTAL DESIGN STEPS

0. UNSATISFACTORY

The candidate does not provide a reasonable description of the steps in the experimental procedure.

1. DOES NOT MEET STANDARD

The candidate provides a reasonable description with no detail of the steps in the experimental procedure.

2. MINIMALLY COMPETENT

The candidate provides a reasonable description with limited detail of the steps in the experimental procedure.

3. COMPETENT

The candidate provides a reasonable description with adequate detail of the steps in the experimental procedure.

4. HIGHLY COMPETENT

The candidate provides a reasonable description with substantial detail of the steps in the experimental procedure.

CRITERION SCORE :

4.00

A2B. REASONING

0.

1. DOES NOT

2.

3.

4. HIGHLY

UNSATISFACTORY	MEET STANDARD	MINIMALLY COMPETENT	COMPETENT	COMPETENT
The candidate does not provide a logical discussion of the reasoning for choosing the experimental design plan.	The candidate provides a logical discussion, with no support, of the reasoning for choosing the experimental design plan.	The candidate provides a logical discussion, with limited support, of the reasoning for choosing the experimental design plan.	The candidate provides a logical discussion, with adequate support, of the reasoning for choosing the experimental design plan.	The candidate provides a logical discussion, with substantial support, of the reasoning for choosing the experimental design plan.
CRITERION SCORE : 2.00				

A2C. SEQUENCE OF EVENTS				
0. UNSATISFACTORY	1. DOES NOT MEET STANDARD	2. MINIMALLY COMPETENT	3. COMPETENT	4. HIGHLY COMPETENT
The candidate does not provide a logical explanation of the sequence of events that will be used to collect quantitative data.	The candidate provides a logical explanation with no detail of the sequence of events that will be used to collect quantitative data.	The candidate provides a logical explanation with limited detail of the sequence of events that will be used to collect quantitative data.	The candidate provides a logical explanation with adequate detail of the sequence of events that will be used to collect quantitative data.	The candidate provides a logical explanation with substantial detail of the sequence of events that will be used to collect quantitative data.
CRITERION SCORE : 2.00 COMMENTS ON THIS CRITERION: 2/2/19 - The report fittingly indicates that quantitative data was collected by measuring the height of a				

ball bounce with meters as the measurement unit.

1/29/19 It is clearly stated in the procedure that the samples will be refrigerated until they can be taken to a lab to be analyzed. It does not appear to be explained how quantitative data will be obtained from these samples.

9/28/18 The response states that gas production was measured in grams each day. The description insufficiently explains the sequence of events that will be used to quantitatively measure the gas production in the experiment.

For instruction on experimental designs and the sequence of events, please revisit the video titled ***Experimental Design Steps vs. Sequence of Events*** in the study plan for this course by clicking on the link located in the top left in this rubric item's name, 'Sequence of Events.'

9/8/18 The process of using a syringe to collect samples from within each model and placing the samples in labeled containers is skillfully described. It is also noted that the samples will be taken to a lab for analysis and that the increase in gas were measured and calculations done. The sequence of events is incomplete because the steps that will be used to measure the gases collected and doing the calculations are not sufficiently detailed.

A2D. TOOLS, TECHNOLOGIES, AND MEASUREMENT UNITS

0. UNSATISFACTORY

The candidate does not provide a reasonable description of the tools, technologies, and measurement units that will be used to collect quantitative data.

1. DOES NOT MEET STANDARD

The candidate provides a reasonable description with no detail of the tools, technologies, and measurement units that will be used to collect quantitative data.

2. MINIMALLY COMPETENT

The candidate provides a reasonable description with limited detail of the tools, technologies, and measurement units that will be used to collect quantitative data.

3. COMPETENT

The candidate provides a reasonable description with adequate detail of the tools, technologies, and measurement units that will be used to collect quantitative data.

4. HIGHLY COMPETENT

The candidate provides a reasonable description with substantial detail of the tools, technologies, and measurement units that will be used to collect quantitative data.

CRITERION SCORE :

2.00

COMMENTS ON THIS CRITERION:

9/28/18 A valid description of the tools and technologies required to collect quantitative data in the experiment is provided, including the use of a balance to record weight (in grams).

9/8/18 The measurement units for the quantitative data are identified as grams of gas per m² per day. The tools and/or technologies that will be used to collect these data on the amounts of different gasses (e.g. carbon dioxide) are not clear.

A3. VARIABLES

0. UNSATISFACTORY	1. DOES NOT MEET STANDARD	2. MINIMALLY COMPETENT	3. COMPETENT	4. HIGHLY COMPETENT
The candidate does not provide a logical explanation of what the dependent, independent, and controlled variables are in the investigation.	The candidate provides a logical explanation with no detail of what the dependent, independent, and controlled variables are in the investigation.	The candidate provides a logical explanation with limited detail of what the dependent, independent, and controlled variables are in the investigation.	The candidate provides a logical explanation with adequate detail of what the dependent, independent, and controlled variables are in the investigation.	The candidate provides a logical explanation with substantial detail of what the dependent, independent, and controlled variables are in the investigation.

CRITERION SCORE :

2.00

COMMENTS ON THIS CRITERION:

2/2/19 - The ball groups are correctly identified as the independent variable, the bounce heights are precisely identified as the dependent variable, and the drop heights are accurately identified as a controlled variable in the experiment.

1/29/19 The measured gases are accurately identified as the dependent variable in the experiment. A control group is identified; the identification of controlled variables in this experiment does not appear to be included.

9/28/18 The report accurately identifies the varying starting material as the independent variable. The

discussion of the gasses as the dependent variable and model D as the controlled variable as model D is incorrect.

9/8/18 The experimental design steps for making the model wetlands with varying amounts of water and for collecting air samples from each model are clearly described. Additionally, samples D1, D2, and D3 are ably listed as controlled samples though these are not the same as controlled variables. Explanations of the dependent, independent, and controlled variables could not be located.

For instruction on identifying variables of an experiment, please revisit the video titled **Variables** in the study plan for this course by clicking on the link located in the top left in this rubric item's name, "Variables."

A4. THREAT REDUCTION TO INTERNAL VALIDITY

0. UNSATISFACTORY

The candidate does not provide a logical explanation of what to do to reduce the threats to internal validity.

1. DOES NOT MEET STANDARD

The candidate provides a logical explanation, with no support, of what to do to reduce the threats to internal validity.

2. MINIMALLY COMPETENT

The candidate provides a logical explanation, with limited support, of what to do to reduce the threats to internal validity.

3. COMPETENT

The candidate provides a logical explanation, with adequate support, of what to do to reduce the threats to internal validity.

4. HIGHLY COMPETENT

The candidate provides a logical explanation, with substantial support, of what to do to reduce the threats to internal validity.

CRITERION SCORE :

2.00

COMMENTS ON THIS CRITERION:

9/28/18 The report clearly explains that correct calibration of instrumentation and performing the experiment at controlled room temperature are ways to reduce the threats to internal validity.

9/8/18 The steps for setting up the experiment and collecting the air samples are aptly described. The steps of what to do to reduce the threats to the internal validity of the experiment are not clear.

For instruction on threats to internal validity, please revisit the video titled **Threats to Internal Validity** in the study plan for this course by clicking on the link located in the top left in this rubric item's name, "Threat Reduction to Internal Validity."

A5. HYPOTHESIS

0. UNSATISFACTORY

The candidate does not provide a logical explanation of the process of developing the hypothesis.

1. DOES NOT MEET STANDARD

The candidate provides a logical explanation with no detail of the process of developing the hypothesis.

2. MINIMALLY COMPETENT

The candidate provides a logical explanation with limited detail of the process of developing the hypothesis.

3. COMPETENT

The candidate provides a logical explanation with adequate detail of the process of developing the hypothesis.

4. HIGHLY COMPETENT

The candidate provides a logical explanation with substantial detail of the process of developing the hypothesis.

CRITERION SCORE :

3.00

COMMENTS ON THIS CRITERION:

9/8/18 Numerous hypotheses regarding the flux of different gasses are expertly stated and logically developed.

B. PROCESS OF DATA COLLECTION

0. UNSATISFACTORY

The candidate does not provide a logical explanation of the process of data collection, including appropriate photographs, tables, or diagrams to clearly show the data collection process.

1. DOES NOT MEET STANDARD

The candidate provides a logical explanation with no detail of the process of data collection, including appropriate photographs, tables, or

2. MINIMALLY COMPETENT

The candidate provides a logical explanation with limited detail of the process of data collection, including appropriate photographs, tables, or

3. COMPETENT

The candidate provides a logical explanation with adequate detail of the process of data collection, including appropriate photographs, tables, or

4. HIGHLY COMPETENT

The candidate provides a logical explanation with substantial detail of the process of data collection, including appropriate photographs, tables, or

diagrams to clearly show the data collection process.

diagrams to clearly show the data collection process.

diagrams to clearly show the data collection process.

diagrams to clearly show the data collection process.

CRITERION SCORE :

2.00

COMMENTS ON THIS CRITERION:

2/2/19 - The report appears to explain that two balls of different textures were dropped from the same height, and the quantitative data was collected by video recording 10 drops with each ball and determining their average bounce heights in meters by watching the videos.

1/29/19 A logical explanation of the use of an infrared photoacoustic spectrometer is provided, along with several graphs for the results section and a helpful table of the water quantities to be provided to each sample in the procedure. Appropriate photographs, tables, or diagrams to clearly show the data collection process could not be located.

9/28/18 The response states that gas production was measured in grams each day. The report insufficiently explains how gas production will be measured, and appropriate photographs, tables, or diagrams to clearly show the data collection process were not apparent.

9/8/18 The report capably explains how a syringe will be used to collect the samples and several bar charts of the results are provided which successfully address rubric aspect C: Results. The explanation of the process of data collection is incomplete because it does not sufficiently explain how the amount of each gas will be measured and appropriate photographs, tables, or diagrams of the data collection process could not be located.

For instruction on data collection processes, please revisit the video titled ***Process of Data Collection*** in the study plan for this course by clicking on the link located in the top left in this rubric item's name, 'Process of Data Collection.'

B1. APPROPRIATE METHODS

0. UNSATISFACTORY

The candidate does not provide a logical discussion of the

1. DOES NOT MEET STANDARD

The candidate provides a logical

2. MINIMALLY COMPETENT

The candidate provides a logical

3. COMPETENT

The candidate provides a logical

4. HIGHLY COMPETENT

The candidate provides a logical

use of appropriate methods, tools, and technologies to collect quantitative data.

discussion with no detail of the use of appropriate methods, tools, and technologies to collect quantitative data.

discussion with limited detail of the use of appropriate methods, tools, and technologies to collect quantitative data.

discussion with adequate detail of the use of appropriate methods, tools, and technologies to collect quantitative data.

discussion with substantial detail of the use of appropriate methods, tools, and technologies to collect quantitative data.

CRITERION SCORE :

2.00

C. RESULTS

0. UNSATISFACTORY

The candidate does not provide a logical explanation of the results of the experiment, including graphical representations of the data collected.

1. DOES NOT MEET STANDARD

The candidate provides a logical explanation with no detail of the results of the experiment, including graphical representations of the data collected.

2. MINIMALLY COMPETENT

The candidate provides a logical explanation with limited detail of the results of the experiment, including graphical representations of the data collected.

3. COMPETENT

The candidate provides a logical explanation with adequate detail of the results of the experiment, including graphical representations of the data collected.

4. HIGHLY COMPETENT

The candidate provides a logical explanation with substantial detail of the results of the experiment, including graphical representations of the data collected.

CRITERION SCORE :

3.00

COMMENTS ON THIS CRITERION:

9/8/18 The results for each type of gas measured are proficiently explained. For example, the report describes that the models C1, C2, and C3 (those with the highest water volume) had the largest methane

emissions and a larger increase in carbon dioxide over time. The numerous bar charts masterfully provide graphical representations of the data collected.

D. CONCLUSION

0. UNSATISFACTORY

The candidate does not provide a logical conclusion derived from the interpretation of the data.

1. DOES NOT MEET STANDARD

The candidate provides a logical conclusion with no support derived from the interpretation of the data.

2. MINIMALLY COMPETENT

The candidate provides a logical conclusion with limited support derived from the interpretation of the data.

3. COMPETENT

The candidate provides a logical conclusion with adequate support derived from the interpretation of the data.

4. HIGHLY COMPETENT

The candidate provides a logical conclusion with substantial support derived from the interpretation of the data.

CRITERION SCORE :

2.00

D1. CONFIRMATION OF HYPOTHESIS

0. UNSATISFACTORY

The candidate does not provide a logical discussion of whether the results confirm or refute the hypothesis.

1. DOES NOT MEET STANDARD

The candidate provides a logical discussion, with no support, of whether the results confirm or refute the hypothesis.

2. MINIMALLY COMPETENT

The candidate provides a logical discussion, with limited support, of whether the results confirm or refute the hypothesis.

3. COMPETENT

The candidate provides a logical discussion, with adequate support, of whether the results confirm or refute the hypothesis.

4. HIGHLY COMPETENT

The candidate provides a logical discussion, with substantial support, of whether the results confirm or refute the hypothesis.

CRITERION SCORE :

3.00

D2. EXPERIMENTAL DESIGN AS KEY FACTOR**0. UNSATISFACTORY**

The candidate does not provide a logical explanation of why experimental design is a key factor in the success of the scientific inquiry.

1. DOES NOT MEET STANDARD

The candidate provides a logical explanation, with no support, of why experimental design is a key factor in the success of the scientific inquiry.

2. MINIMALLY COMPETENT

The candidate provides a logical explanation, with limited support, of why experimental design is a key factor in the success of the scientific inquiry.

3. COMPETENT

The candidate provides a logical explanation, with adequate support, of why experimental design is a key factor in the success of the scientific inquiry.

4. HIGHLY COMPETENT

The candidate provides a logical explanation, with substantial support, of why experimental design is a key factor in the success of the scientific inquiry.

CRITERION SCORE :

2.00

COMMENTS ON THIS CRITERION:

1/29/19 The roles of control, randomization, and replication in this experiment are explained effectively.

9/28/18 The response states that the results of the experiment could be used to develop a highly saturated nitrate filtering system. A clear explanation of why experimental design is a key factor in the success of the scientific inquiry was not apparent.

For instruction on the importance of experimental design, please revisit the video titled **Conclusion** in the study plan for this course by clicking on the link located in the top left in this rubric item's name, "Experimental Design as Key Factor."

9/8/18 An experimental design plan for comparing different constructed wetlands is successfully laid out. An explanation of why experimental design is a key factor in the success of an experiment could not be located.

D3. REPLICATION

0. UNSATISFACTORY

The candidate does not provide a logical explanation of how the investigation can be replicated by someone else.

1. DOES NOT MEET STANDARD

The candidate provides a logical explanation, with no support, of how the investigation can be replicated by someone else.

2. MINIMALLY COMPETENT

The candidate provides a logical explanation, with limited support, of how the investigation can be replicated by someone else.

3. COMPETENT

The candidate provides a logical explanation, with adequate support, of how the investigation can be replicated by someone else.

4. HIGHLY COMPETENT

The candidate provides a logical explanation, with substantial support, of how the investigation can be replicated by someone else.

CRITERION SCORE :

3.00

COMMENTS ON THIS CRITERION:

1/29/19 A nicely detailed description of how the experiment could be replicated includes the notation that soil is the most uncertain aspect of the procedure and that it is crucial that the same soil should be used for each sample.

9/28/18 The report clearly states that the results of the experiment could be used to create a model filtration system for nitrogen. An explanation of how the investigation can be replicated by someone else could not be found.

For instruction on replication, please revisit the video titled **Replication** in the study plan for this course by clicking on the link located in the top left in this rubric item's name, "Replication."

9/8/18 The experiment for comparing different model wetlands is adeptly described. An explanation of how this experiment could be replicated by someone else could not be located.

D3A. EVALUATION OF VALIDITY

0. UNSATISFACTORY

1. DOES NOT MEET

2. MINIMALLY

3. COMPETENT

4. HIGHLY COMPETENT

	STANDARD	COMPETENT		
The candidate does not provide a logical discussion of how the replication of an experiment is an evaluation of validity.	The candidate provides a logical discussion, with no support, of how the replication of an experiment is an evaluation of validity.	The candidate provides a logical discussion, with limited support, of how the replication of an experiment is an evaluation of validity.	The candidate provides a logical discussion, with adequate support, of how the replication of an experiment is an evaluation of validity.	The candidate provides a logical discussion, with substantial support, of how the replication of an experiment is an evaluation of validity.

CRITERION SCORE :

2.00

COMMENTS ON THIS CRITERION:

2/2/19 - The submission appears to accurately explain that similar outcomes when replicating makes the results more sound and that results cannot be trusted when they cannot be replicated.

1/29/19 A statement that the experiment's validity is self-evident is provided. An explanation of how replication of an experiment is an evaluation of its validity does not appear to be discussed.

9/28/18 A valid discussion of how the results of the experiment prove the original hypotheses is provided. A discussion of how the replication of an experiment is an evaluation of validity was not apparent.

9/8/18 The conclusion comprehensively summarizes the results of the constructed wetland experiment. The conclusion is incomplete because a discussion of how replication of an experiment evaluates whether or not the experiment and its results are valid could not be located.

For instruction on replication as an evaluation of validity, please revisit the video titled **Conclusion** in the study plan for this course by clicking on the link located in the top left in this rubric item's name, "Evaluation of Validity."

E. SOURCES

0.
UNSATISFACTORY

1. DOES NOT
MEET
STANDARD

2. MINIMALLY
COMPETENT

3.
COMPETENT

4. HIGHLY
COMPETENT

When the candidate uses sources, the candidate does not provide in-text citations and references.

When the candidate uses sources, the candidate provides only some in-text citations and references.

When the candidate uses sources, the candidate provides appropriate in-text citations and references with major deviations from APA style.

When the candidate uses sources, the candidate provides appropriate in-text citations and references with minor deviations from APA style.

When the candidate uses sources, the candidate provides appropriate in-text citations and references with no readily detectable deviations from APA style, OR the candidate does not use sources.

CRITERION SCORE :

4.00