



## Chapter 6 – Appendix IV – Mack

### **6.6. Mack - Learning Task 1 - Kingdom Monera**

#### 6.6.1. Step 3: Planning Action

##### *6.6.1.1. A. Learning task design*

##### *6.6.2.2.A. Learning task assessment*

### **Learning Task 2 - Kingdom Monera**

#### *6.6.1.1. B. Learning task design*

#### *6.6.2.2.B. Learning task assessment*

*Concept map*



Wack (LT 1)

### Learning Task Design

**Date:** 10 May 2004

**Learning Area:** Life Science

**Learning Phase:** 11

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#### **Specific Outcomes:**

**LO1:** Confidently explore & investigate phenomena related to Life Science by using inquiry, problem solving, critical thinking and other skills

**LO2:** Access, interpret, construct & use Life Sciences concepts to explain phenomena relevant to Life Sciences

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#### **Assessment Standards:**

##### **LO1:**

**AS 1:** Identifying & questioning phenomena & planning an investigation

**AS 2:** Conducting an investigation by collecting & manipulating data

**AS 3:** Analyzing, synthesizing, evaluating data & communicating findings

##### **LO2:**

**AS 1:** Accessing knowledge

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#### **The Problem:**

What is the best possible way of eradicating the bacteria that you have grown on your agar plates and how can you relate this to your own life?

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**Resources:**

<b>Agar plates from previous learning task</b>
<b>Assessment Rubric</b>
<b>Overhead transparency: Example of a data sheet</b>
<b>Pens &amp; Paper</b>
<b>Scalpel / scissors for opening agar plates</b>

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**Class Organization:**

The class will be seated at the front of the lab at their desks for the beginning of the lesson while the facilitator presents the learning task

The class will then move to the back of the lab where they will sit with their groups at one desk (i.e. four people at a desk, facing each other)

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**Time Allocated:**

5 min	Morning and settle down
20 min	Presentation of learning task
25 min	Work in group and begin to write up the report
<b>Next lesson:</b>	
50 min	Finish group report
<b>Homework:</b>	
4 days	Individual report to be done at home



PORTUURASSESSERING SELFASSESSERING		PEER ASSESSMENT SELF ASSESSMENT		D		
DATUM: DATE: 10/05/04 NAAM/NAME: LEERTAAKNUMMER LEARNING TASK NUMBER: ①		(Dui aan watter assessering jy doen/Indicate which assessment it is?) PORTUURASSESSERING <input checked="" type="checkbox"/> PEER ASSESSMENT <input type="checkbox"/> SELFASSESSERING <input type="checkbox"/> SELF ASSESSMENT <input type="checkbox"/>				
INISIËRING VAN LEER INITIATING LEARNING						
INSTRUKSIE: INSTRUCTION:		Omkring syfer van die mees geskikte kommentaar Encircle number of most applicable comment				
KRITERIA/CRITERIA						
Leerklimaat Learning climate	1	Suiwer fokus, relevant en hou direk met leeruitkomste verband <u>Highly focused, relevant, related to learning outcome</u>	1	2	3	4
	2	Aandag vasgevang / <u>Captivates attention</u>				
	3	Poging aangewend, genotvol maar irrelevant vir leeruitkomste <u>Attempt made, pleasurable but irrelevant to learning outcome</u>				
	4	Geen poging om 'n leerklimaat te skep nie <u>No attempt to setting a learning climate</u>				
Probleemstelling Posing a problem	1	Uitnemende probleemstelling, helder, relevant, dringend en uitdagend <u>An exceptional problem, clear, relevant, challenging and urgent</u>	1	2	3	4
	2	Probleem relevant, uitdagend, dringend maar is nie helder geformuleer nie <u>Problem relevant, challenging, urgent but lacks clarity</u>				
	3	Probleem helder geformuleer, irrelevant, nie-uitdagend of dringend nie / <u>Problem clear but lacks relevance, challenge and urgency</u>				
	4	Geen probleem nie of wollerig / <u>No problem stated or fuzzy</u>				
Bestuur van leer Learning management	1	Uiters georganiseerd en absoluut relevant vir leerderaktiwiteite <u>Highly organized, suitably relevant for learner activities</u>	1	2	3	4
	2	Goed georganiseer vir beperkte leerderaktiwiteite <u>Well organized for limited learner activities</u>				
	3	Organisasie kort meer ontwerp & beplanning vir leerderaktiwiteite <u>Organisation needs more design &amp; planning for learner activities</u>				
	4	Min of geen organisasie of beplanning vir leerderaktiwiteite nie <u>Little or no organization, nor planned learner activities</u>				
Leermedia Learning media	1	Opwindende, kreatiewe, relevante, geïntegreerde gebruik van leermedia & ander bronne / <u>Exciting, original, relevant, integrated use of learning media &amp; other resources</u>	1	2	3	4
	2	Relevante gebruik van leermedia en ander bronne <u>Relevant use of learning media and other resources</u>				
	3	Min gebruik/beperkte gebruik van leermedia en ander bronne <u>Little/some use of learning media and other resources</u>				
	4	Geen gebruik van leermedia of ander bronne nie <u>No use of learning media and other resources</u>				
Koöperatiewe leer Cooperative learning	1	Hoogs effektiewe, suksesvolle gebruik van koöperatiewe leer <u>Highly effective, successful use of cooperative learning</u>	1	2	3	4
	2	Redelike effektiewe gebruik van koöperatiewe leer <u>Partially effective use of cooperative learning</u>				
	3	Hanteer groepwerk en/of paarwerk <u>Managed group and /or pair work</u>				
	4	Geen koöperatiewe leer/groepwerk/paarwerk probeer nie <u>Attempted no cooperative learning/group work or pair work</u>				
Lerder- betrokkenheid Learner involvement	1	Hele groep is hoogs geïnteresseerd, gemotiveerd, neem verantwoordelikheid vir eie leer / <u>Total group involved, highly interested, motivated, takes responsibility for own learning</u>	1	2	3	4
	2	Sommige is by tye geïnteresseerd, / <u>At times a few show an interest</u>				
	3	Meeste is verveeld, stil en onbetrokke <u>Many bored, quiet and uninvolved</u>				
	4	Die klas is verveeld, buite beheer en lawaaierig <u>Class is bored, unruly, noisy</u>				
Tydsbestuur Time management	1	Uitstekende tydsbestuur, uiters sensitief t.o.v leerdere se behoeftes <u>Excellent paced, highly sensitive towards needs of learners</u>	1	2	3	4
	2	Goeie tydsbestuur, bewus van leerdere se behoeftes <u>Well paced, aware of learners' needs</u>				



	3 Laat toe dat aandag afgetrek word, fokus op individuele leerders <u>Allows distraction, focus is on individual learners' needs</u>				
	4 Mors tyd, te haastig, neem leerders se behoeftes glad nie in ag nie <u>Wastes time, rushed, no awareness of learners' needs</u>				
Kommunikasie Communication	1 Uitstekende taalgebruik, lewendig, entoesiasies, duidelik, hoorbaar, energiek <u>Exceptional language usage, vivid, enthusiastic, energetic, clear, audible</u>	1	2	3	4
	2 Entoesiasies, energiek en duidelik verstaanbaar <u>Enthusiastic, energetic, clear</u>				
	3 Duidelik en hoorbaar <u>Clear and audible</u>				
	4 Oninspirerend, onduidelik, onseker, vervelig <u>Inaudible, uninspiring, boring, insecure</u>				

INSTANDHOUDING VAN LEER MAINTAINING LEARNING		KRITERIA / CRITERIA			
Moniteringsvaardighede Monitoring skills	1 Daag leerders uit om met selfvertroue onafhanklik te dink / <u>Challenges learners to be confident, independent thinkers</u>				
	2 Fokus op leerderdenke / <u>Focused on learner thinking</u>	1	2	3	4
	3 Geneig om antwoorde te gee / <u>Tends to give solutions</u>				
	4 Maak leerders afhanklik en onseker / <u>Makes learners dependent and insecure</u>				
Hantering van terugvoer Managing feedback	1 Luister met aandag, verstaan, gee uitdagende en logiese insette / <u>Attentive listening, understanding, offers challenging, logical inferences</u>				
	2 Luister met aandag, gee erkenning, interpreteer die kernaspekte / <u>Attentive listening, gives recognition, interprets main ideas</u>	1	2	3	4
	3 Luister halfhartig, gee min erkenning, min of geen terugvoer / <u>Listens with little attention, little recognition given, little or no feedback</u>				
	4 Bevooroordeelde, veroordelende, afbrekende terugvoer / <u>Biased, judgmental, derogatory feedback</u>				
Skryf jou: Ontwikkelingsdoelwitte  Write down your: Development targets	<p><i>Focus your attention on one side - answering the ind. question =&gt; @ bore out! Try involve the whole class. If they don't respond = pick on them. You have excellent content knowledge. Very little discipline = WATCH out or they'd bore out their chance in @.</i></p> <p><i>Having to explain same things over &amp; over again =&gt; Needs to get @ immediate attention.</i></p> <p><i>Need more structure - eq. forget plates. Established good rapport with the classes.</i></p> <p><i>Classes are engaged more in group activity =&gt; attentive learning.</i></p>				

Kommentaar/Comments:

Geteken/ Signed





Wack LT (2)

**LEARNING TASK DESIGN:**

**DATE:** 14 June 2004

**LEARNING AREA:** Life Sciences

**LEARNING GRADE:** 11

**CONTENT AREA AND THEME:**

Content Areas	LO	Themes			
Environmental Studies	LO <sub>1</sub>	Investigation of human influences on the environment			
		Management & maintenance of natural resources			
		Investigation of a local environmental issue			
	LO <sub>2</sub>	Human influences on the environment			
		Sustaining our environment			
		Air, land & water-borne diseases			
	LO <sub>3</sub>	Historical developments			
		Exploitation vs. sustainability			
		Industrialization & the impact of industry			
		Management of resources			
		Eco-tourism			
		Air			
Diversity, Change and Continuity	LO <sub>1</sub>	Planning, conducting & investigating plants & animals			
		Analysis of given data / findings to evaluate growth			
		Measurement of population growth			
		Collection & analysis of data on community diseases			
		Analysis & evaluation of a specific human behavior			
		Collection & analysis of data on evolutionary trends			
	LO <sub>2</sub>	Population studies			
		Social behavior			
		Managing populations			
	LO <sub>3</sub>	Historical developments			
		Adaptation and survival			
		Sustainable development			
		History and the nature of science			
		Extinction of species			
		Fossil records, museums, zoos			
		Population changes over time			
		Beliefs about creation and evolution			
		Changes of knowledge			

  

Content Areas	LO	Themes			
Tissues, Cells and Molecular Studies	LO <sub>1</sub>	Research in the field of biotechnology			
		Microscopic skills			
		Investigation of (community) diseases		X	
	LO <sub>2</sub>	Micro-organisms	Diseases		X
			Immunity		
		Ethics and Legislation			
LO <sub>3</sub>	Indigenous knowledge systems	Beliefs, attitudes and values			
Structure, control and processes in basic life systems of plants and humans	LO <sub>1</sub>	Structure of systems			
		Experimental investigation		X	
		Designing a model			
		Microscope work			
	LO <sub>2</sub>	Conducting research on any latest medical practices			
		Structure of systems			
		Support (structural)			
		Transport			
		Excretion			
		Nervous and endocrine systems			
	LO <sub>3</sub>	Related diseases of the above			
		Medical conditions			
		Historical developments			
		Food manufacturing and preservation			
LO <sub>3</sub>	Blood transfusion				
	Life support systems and ethics				
	Sperm banks, surrogate motherhood, test tube babies				
	Sexuality, ethics and beliefs				



**LEARNING OUTCOMES AND ASSESSMENT STANDARDS:**

Learning Outcomes:	Assessment Standards:	Learner is able to:	
LO <sub>1</sub> : Confidently explore & investigate phenomena related to Life Science by using inquiry, problem solving, critical thinking and other skills	AS <sub>1/1</sub> : Identifying & questioning phenomena & planning an investigation	X	Identify phenomena involving one variable to be tested
		X	Design simple tests to measure the effect of this variable
		X	Identify advantages and limitations of experimental design
	AS <sub>2/1</sub> : Conducting an investigation by collecting & manipulating data	X	Systematically & accurately collect data using selected instruments and/or techniques
		X	Select a type of display that communicates the data effectively
		X	Compare data & construct meaning to explain findings
AS <sub>3/1</sub> : Analyzing, synthesizing, evaluating data & communicating findings	X	Draw conclusions and recognize inconsistencies in the data	
	X	Assess the value of the experimental process & communicate findings	
	X		
LO <sub>2</sub> : Access, interpret, construct & use Life Sciences concepts to explain phenomena relevant to Life Sciences	AS <sub>1/2</sub> : Accessing knowledge	X	Use various methods & sources to access information
		X	Identify, describe & explain concepts, principals, laws, theories and models by illustrating relationships
	AS <sub>2/2</sub> : Interpreting and making meaning of knowledge in the Life Sciences	X	Evaluate concepts, principals, laws, theories & models
LO <sub>3</sub> : Able to demonstrate an understanding of the nature of science, the influence of ethics & biases in the Life Sciences, & the interrelationship of science, technology, indigenous knowledge, the environment & society	AS <sub>3/2</sub> : Showing an understanding of application of Life Sciences knowledge in everyday life	X	Analyze & evaluate the costs & benefits of applies Life Sciences knowledge
	AS <sub>1/3</sub> : Exploring & evaluating scientific ideas of the past and present cultures		Compare scientific ideas & indigenous knowledge of past & present cultures
	AS <sub>2/3</sub> : Comparing and evaluating the use & development of resources and products and their impact on the environment		Compare the different ways in which resources are used to in the development of biotechnological products, & analyze the impacts on the environment
AS <sub>3/3</sub> : Compare the influence of the different beliefs, attitudes & values on scientific knowledge		Compare scientific ideas & indigenous knowledge of the past & present cultures	

**PROBLEM STATEMENT:**

- What is the *best possible* way that you can go about *recording your observations* from the agar plates which you have infected with microorganisms and disinfected with various substances?
- What then is the *most concise, comprehensive and visually appealing* way that you can *communicate* this data?
- What are *all the possible* ways that you can use the knowledge that you have gained to affect your *everyday life* in the *most positive* way?





**PRESENTATION OF LEARNING TASK:**

CLARITY:

- Placement of groups
- Use of assessment rubric
- Recording of scientific data
- Observing of colonies
- Everyone needs to hand in an individual and group report

IMPORTANCE:

- Why they should study disinfection
- Why write a scientific report
- Why accuracy and precision are important when writing methods and materials
- Why accuracy and precision are important when doing observations

URGENCY:

- Explain that there are only two school periods for group report
- Explain that they have four days to do individual report and must be handed in

**THE LEARNING TASK:**

This LT is designed to get learners to think about the various different disinfectants and bacteria that they come into contact in their daily lives. They are therefore able to realize that the world consists of more than what they can observe with their naked eye.

- Before the learners are given the agar plates to observe they need to state what they think would have happened in their experiment in the form of a hypothesis.
- They must also state exactly how they went about doing the experiment by providing exact methods and materials
- The learners then need to make observations from their agar plates.
- Next they need to work out how best they can record their observation / data.
- Once they have recorded their observations they need to translate the data into a more informative result (e.g. a graph)
- They now need to work individually in order to discuss why they obtained their results that they did and how they could improve on this next time
- Lastly they will have a consolidation session in which they discuss various questions such as why it was important to be very precise in recording their methods and materials.



**AUTHENTIC LEARNING CONTEXT:**

The authenticity of this LT comes from the fact that they are dealing with bacteria that they come into contact in their daily lives as well as disinfectants which they use in their daily lives. They are also asked, in their reports, to relate what they have discovered to their daily lives and how this will help them improve their lives.

Two other things that will help to create this context are:

- Overhead: SA Centre for Microbiology
- Group names placed at each desk at the back of the class (i.e. lab 1-6)

**TIME ALLOCATED:**

Cumulative Time	Time per Activity	Activity
2 min	2 min	Welcome and focus
12 min	10 min	LTP
13 min	1 min	Move to back
18 min	5 min	Read through assessment rubric and ask questions for clarity
20 min	2 min	Agar plates handed out
45 min	25 min	Observe and record data in your group
50 min	5 min	Determine rate and quality of learning and where to start next lesson

**RESOURCES:**

Equipment / Apparatus / Materials	Quantity	Cost
Overhead: SA Centre for Microbiology	1	R 2-00
Group names (lab 1 to 6)	6	R 1-00
Assessment rubrics and info sheets	25	R 5-00
Agar plates from previous LT	6	
Scalpel for opening agar plates	6	

**ASSESSMENT METHOD:**

- Assessment carried out according to the assessment rubric
- Recorded in a mark sheet as a portfolio assignment



# Urgent Request From HQ

The *South African Center of Microbiology* (HQ) requires an urgent report so that they can take necessary steps to eradicate the present bacterial threat. Before we run out of time and the bacterial infection becomes uncontrollable, your team of microbiologists is required to write a report on the best possible means of eradicating this particular bacteria.

HQ however also requires that they get as many possible solutions and have therefore requested that all the microbiologists in your team supply their individual opinion / solutions to the problem.

## Your Team's Assessment Rubric

### Bacterial Identification:

No description of colonies	0
Description incomplete	1-4
Description complete but not detailed	5-6
Comprehensive description, includes drawings	7-9
Excellent use of descriptive terminology / precise, neat drawings	10

### Bacterial Eradication:

<b>Hypothesis</b>	
No hypothesis made	0
Hypothesis made but irrelevant or incomplete	1-2
Informative and relevant hypothesis	3
<b>Material</b>	
No materials listed	0
Materials listed but incomplete	1
Complete material list but lacks detail	2
Complete, detailed list of materials	3
<b>Method</b>	
No method included	0
Method lacks crucial steps	1
All crucial steps included but lacks detail	2
Detailed description of all steps	3-4
<b>Results</b>	
<i>Table</i>	
No table included	0
Table drawn but incomplete	1
Comprehensive table drawn	2
<i>Graph</i>	
No graph drawn	0
Graph drawn but irrelevant	1-2
Precise, neat graph drawn	3
<b>TOTAL</b>	<b>25</b>



## Individual Assessment Rubric

### Bacterial Eradication:

<b>Discussion</b>	
No discussion written	0
Inadequate explanation of findings / no references or life application	1-3
Logical explanation but not detailed / life application irrelevant	4-6
Detailed explanation / good references / a few relevant applications	7-9
Detailed explanation & references / unique/ numerous relevant applications	10-12
<b>Conclusion</b>	
No conclusion made	0
Irrelevant conclusion	1
Uninformative conclusion	2
Informative and relevant conclusion	3
<b>TOTAL</b>	<b>15</b>

### Report format

- Hypothesis:** States your predication of what will happen once the experiment has been carried out. Must be in an “if..... then .....” format. Make sure that your hypothesis is not an aim or a question.
- Materials:** States very accurately and precisely the equipment and apparatus that you used for the investigation
- Method:** States accurate and precise details of how you carried out your investigation. Should be written so that someone else can exactly reproduce your experiment to obtain the exact results that you obtained
- Raw data:** States the data that you obtained from the direct observations of your investigation / agar plates.
- Results:** The information that is obtained after the data has been analyzed. This information should relate your data in the most concise, comprehensive and visually appealing manner possible. E.g. use of graphs
- Discussion:** The results that you obtained are explained in this section. If results are not what you expected in your hypothesis then this is where you give reasons. Use relevant references from books, articles, internet, ect, to help discuss your observations. You must also include how you or someone else can use the information gathered in your investigation in their daily lives.
- Conclusion:** Concludes your argument in a short, concise and powerful way.

## **Operation of a Learning Task**

This LT is the third part of a three part series. During the first LT they infected some agar plates by streaking various objects over the surface of the agar. The next part was when they had to observe the growth on their agar plates and to draw what they had observed using a “key” that had been provided. Also during the second part, they transferred a bacterial colony to a fresh agar plate and placed various disinfectant substances onto the surface of the agar.

During this LT they will therefore be required to make observations from their disinfected agar plates and to record these in the most appropriate manner. They will then have to write up the whole experiment into a scientific report format and write an individual discussion at home.

### **Description of occurrences during the Lesson:**

#### **Learning Task Presentation:** (labelled “*LTP\_10\_May*” on CD)

- Rubrics have been placed at the desks at the back of the lab, therefore they do not have anything in front of them yet. Explanation that this is not like a usual practical report because the learner will do half in groups and the other half individually.
- Learner’s agar plates are at the front of the lab. Statement, “some came out well and others did not come out as well because of the way you spread your colonies”
- Explanation that they need to write down their hypothesis
- Record your methods and materials and why it is important to have an accurate method and material section.
- Learners are asked why the different results were obtained: streaking / different bacteria isolated / different amounts of disinfectant
- Discussing how to write up results and overhead of an example of a data sheet is provided to the learners. Learners provided with the option to use their own method of recording.
- Class asked to move to back but stopped by a question from one of the learners, “what is the individual and what is the group work?”
- Question from student “When must it be finished?” Students have four days to finish and must therefore be handed in on Friday.
- Learners asked to go to back and read through the rubric for five minutes or so and to



collect their agar plates from the front of the classroom.

**Learning Task Execution:** (labelled “*LTE\_10\_May*” on CD)

I unfortunately did not have someone in the classroom to record my LTE and therefore I placed the video recorder on the top of a desk. It was therefore stationary and therefore did not pick up much of the action.

- The learners are now sitting in their groups at the back of the class and some are reading through the rubric but many are already looking at the agar plates.
- I walk around checking to see that everyone is clear on what they have to do.
- Learners then begin to write a hypothesis for their experiment but many have trouble in understanding what a hypothesis is and it is not well documented on their sheet.
- Problems arise as to how accurate they should be in their methods and materials section. I explain that it must be as accurate as possible.
- Most groups use the table provided to record their results.
- Some groups work fast enough to start transferring their data on a more informative graph. Most groups however do this in the next lesson.
- No LTC is carried out

**Reflection and improvement on occurrences:**

**Learning Task Presentation:** (labelled “*LTP\_10\_May*” on CD)

- The fact that I put the rubrics that the will be assessed at the back of the class got me wondering whether this was actually the best possible way to do this. They seemed quite confused when I was explaining to them what was in the rubrics because they did not have it in front of them. It may have been more productive to have a short introduction at the beginning of the class and then to provide them with the rubrics, which they could have 5 minutes to read through. I would then give them a time to discuss it and I could clarify anything that they did not understand when reading the rubric sheet.
- I make the statement that some of the groups did not streak their plates well enough, however I should not be making this statement as it should be up to the learner to discover why their plate did not perform as it should have. I could therefore leave them with a question but I should not provide them with the answers
- They were now told that they would need to write down their hypothesis, however this is teaching them wrong scientific method because they should have created a hypothesis



before the investigation and not after they have seen the results. They should therefore have written their hypothesis before I provided them with the plates or during the previous lesson.

- I feel that once again I could have left them with a question relating to why it is important to record your methods and material accurately. They could have then talked about it in their groups and it would have been best if during the LTC the class had discussed the importance of accurately recording methods and material during scientific investigation.
- Once again it was discussed why there were discrepancies between the different groups results, however the LTP is not the time for this to take place and learners should once again be left with the question but not the answer.
- The learners where provided with an overhead of an example of a data sheet, however this is defiantly limiting them because all they have to do is to copy it off the board and record their data in it. It however they were not provided with this example, they would have to think about how they are going to record there data. This exercise will stand them in good stead for the next time that they have to do a similar thing and they do not have an example to copy.
- The question that was asked by the learner after I asked them to move to the back means that there was not complete clarity on what they had to do. I should have therefore set out my LTP in a more structured and clear manner, making sure to make it clear, important and urgent for the learners. I defiantly did not make this LT have any importance to the learner even though it does have a lot of real life significance, I merely failed<sup>to</sup> present it to them.
- The next question was “When must it be finished?” This question would not have been asked if had not made the LT had been presented with an urgency about it, I should therefore have explained that they only had a sort time to finish the report. I did however explain this but only after the question had been asked. Therefore if the question was not asked, I would not have explained it.
- I then asked the learners to go to there group desks at the back of the class and read through the rubric so that they fully understood what to do. Where I went wrong here was that I also provided them with their agar plates and therefore they were all looking at the agar plates and only a limited few where concentrating on reading the rubric. I should have enforced that they read first, then ask questions for clarity and once everyone understood what they needed to do, I would only then provide them with their agar plates.

