

Integration Week- end (WEI): In the International Space Station or in Dordogne?

A problem-based learning (PBL) intended for students
of the NDT module of the AP5MO UE of 1st year of ENSPIMA

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Your Mission

A problem of cracks was detected in the International Space Station in July 2021:
<https://www.independent.co.uk/space/iss-cracks-space-station-international-b1911557.html>¹

Thamos Pesteque, a frequent visitor to Evering as part of his zero G flights, believes that Evering students, excellent in NDT thanks in part to their outstanding professors, could be of great assistance in determining the severity of the cracks and searching for other possible defects in the surrounding metal and composite parts. Your mission, if you accept it, is to present a precise test procedure to Thamos Pesteque that could be implemented with the NDT* equipment available at Evering.

In exchange for this first mission, if the proposed procedure seems useful to him, he will send you the suspicious parts to screen them at Evering (this will be the subject of PBL2). In exchange for this valuable service you provide (and also because it suits him), he will suggest that you bring back the parts yourself and spend a weekend at the ISS (much better than a WEI in Dordogne!!).

NB : Thamos Pesteque, an NDT expert (yes we can't have everything), will be available for a short time during the first session of the PBL1 to answer your questions.



La Station spatiale internationale, en septembre 2000. PHOTO / NASA PHOTO / AFP

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* NDT : NonDestructive Testing

¹ Link verified on the 07/11/2021





Organisation of this sequence: Phases and steps









Phase	Duration	Steps	Explanations
First phase In group In class	5min	Organise the group	Together, define the role of each group member
	20min	Discover and rephrase the problem	After reading the context alone, define the keywords and questions that may arise regarding these keywords in a group. What exactly is the problem you have to solve? What are you being asked to do?
	30min	Design a pathway	Define which elements and concepts need to be explained, propose a list of relevant questions , identify a pathway to reach the solution, and define a list of expected deliverables .
	10min	Define the knowledge needed	Clearly define what is known and what is unknown . What data is missing to solve the problem? What are the intended learning outcomes? What deliverables do you need to produce in this case?
	15min	Define a working plan	Which steps do each of you need to follow in order to collect the information needed (research, experiments, interviews...)?

Phase	Duration	Steps	Explanations
2nd Phase Individual ly At home	1h20min	Implement the action plan	Each student in the group has to work on every step that has been defined in the action plan. You must collect and analyse information to explain and solve the problem.

Phase	Duration	Steps	Explanations
Final Phase In group In class	5min	Determine the role of each partner	If necessary, you can change some roles
	50min	Share everyone's production and prepare the deliverable	Each group member shares what they have found, which resources were used, and which conclusions help to solve the problem. Everyone can check and propose improvements to the outcomes. The group then builds a common response, with an explanatory solution to the problem.
	25min	Assess	You assess the group work alone. Compare your answers together. Then assess your learning outcomes and your work individually.



What is your role in the group?

	The driver guides the progress of the group work. They ensure that each step is completed. They put out an alert if a task is forgotten, and need to find collective solutions when required.
	The timekeeper is responsible for keeping to the collective work schedule. They ensure optimal use of the time available.
	The scribe writes down all the points that have been discussed, whatever they are, and all the positions expressed during the meeting(s). They write them on a blackboard, paperboard, or any other surface that can be viewed by all the group members.
	The facilitator's role is key to ensuring that everyone can express their opinion freely and to meet the goal of the meeting. They can help to develop a common understanding and to create a pleasant work atmosphere.
	The secretary is responsible for summarising the main ideas, hypotheses, decisions taken, and working outcomes of the group. They are in charge of communicating these data to all the group members.
	The speaker reports the process, work status, and the group's results to the teacher, the tutor, the whole class, or to any external person necessary.
	The reviewer is in charge of the progress points. They report what has been done and what remains to be done.
	The observer looks at how the group functions. They report their observations to improve the way the group operates.



Resources

- Documents on MOODLE Pages: NDT Courses, Exercises and correction, Test of the practicals
- Article²: <https://www.independent.co.uk/space/iss-cracks-space-station-international-b1911557.html>
- Other ressources : On the second reflection phase of the "GO" session, specific items on the parts to be inspected will be available to the students (short mock call with Thamos Pesteque).

² Link verified on the 7th November 2021





Assessment

Evaluation of the group work

You will assess individually the group work: on a scale from 1 to 5:

Assessment	Totally no	no	yes	Totally yes
About the group's outputs				
Did the group follow each step of the PBL sequence?				
Did the group achieve the intended learning outcomes?				
Did the group produce what was asked?				
About the group's organisation				
Did the group atmosphere and interactions facilitate efficiency?				
Was everyone able to express themselves?				
Could the group's work be improved?				
Did everyone stick to their role during the different phases?				
Self-assessment				
How qualitative and efficient were my interactions with the group?				
How qualitative and efficient was my production?				
About the complex problem				
Was the topic interesting?				
About the relationship with the tutor				
Did the tutor guide the group effectively by asking the right questions to refocus when needed?				