Inclusive lesson plans using the NinU grid – Watts & Weirauch

Attachment 4: Revised version after applying the NinU-Raster

(Text in green: Additions and changes initiated by the use of the NinU-Raster. The codes in parentheses following these changes refers to the specific questions in the NinU-Raster; A-D are columns, I-III and 1-4 refer to rows).

This unit was planned for a class where all students are literate and speak the primary teaching language.

Assumed prior knowledge for this lesson plan:

- They have a basic nutritional understanding of carbohydrates and sugars.
- They have done detection tests and have experience of basic lab work and experimental setups.

First unit					
Approx.	Phases	Activity	Media/method		
time					
All materi	All materials used in these units should be designed in accordance with Easy-to-Read guidelines, should use pictures and icons and where possible a variety of				
represent	ation forms (audio,	/text/tactile) should be offered.			
5 min	Contact phase	The teacher shows a glass of milk and encourages the students to name it and describe their	Packages of different milks (names		
	('Begegnungs-	experiences with milk.	covered)		
	phase')	e.g. How is milk it used at your home or in your family tradition? (A-I-4)			
10 min		The teacher says that they want to do a milk-testing and asks whether there are students			
		who can't or don't want to drink milk. (A-II-1)			
		Some students may say that they can't drink milk;	Class-discussion		
		encourage them to contribute with pre-knowledge or preconceptions about it (A-I-3 & -4)			
		Alternatively, some students may ask about the different kinds of milk because they are			
		vegan or lactose-intolerant. In this case, the teacher tells them that vegans can safely drink			
		milk number 2 (plant-based) and lactose-intolerant students can drink milk number 3			
		(lactose-free) (C-II-1 & C-III-1-3)			

		The teacher lets the students test the three different milks but doesn't tell the difference yet (1 = normal milk, 2 = plant-based milk, 3 = lactose-free milk) pupils articulate their perceptions of different flavours; pupils should describe taste, texture, etc. to those students who were not able or willing to participate in the testing. (A-I-3 /-4)	Prepare alternatives to drinking (e.g. feeding-tube) Testing of different milks (milks & cups prepared in advance) Work with partner
10 min	Curiosity and planning phase ('Neugier- und Planungsphase')	The teacher asks the students what they think the differences are between the three milks and why some are okay for vegans (and others for lactose-intolerant people). The teacher can encourage those students who couldn't participate in the testing to contribute to the discussion (C-III-4): Why can our lactose-intolerant students drink milks 2 (lactose-free) and 3 (plant-based)?	Collecting ideas in a mind map e.g. with the help of an e-board (e.g. Miro board)
		(A-I-4) The students (lactose-intolerant students should be given word when present) suggest which kinds of milk are in the different packages; the teacher lifts the covers of the packages (and shows them via camera).	Packages of milk without covers, camera Recording the questions on a board
7 min		The teacher asks the students to find out and write down the information that they will need to answer the questions. Questions: - What is lactose? - What are the contents of the milks 1, 2, and 3? - What do milks 2 and 3 have in common and what are the differences? The teacher encourages the students to recall what they know about different categories of substances in food/macromolecules in food and asks the students which category they think lactose could fall in. The class states what categories there are (carbohydrates/proteins/fats) (idea from Ambitious Science Teaching, AST)	(keep a record of them for later reference) Discourse between teacher & pupils

5 min	The teacher should help the students express their ideas, e.g. by suggesting scientific terminology (B-II-1 & B-III-1,3,5)	Collect new relevant vocabulary terms on the e-board
3 min	The class develops a plan for research and experiments that should be done in the next lesson. The teacher assists by showing the students a list of detection tests for different substances, e.g. sugars in general, tests for special sugars, tests for other sweeteners, Woehlk test for lactose, tests for proteins, carbohydrates, etc. that they may choose from. To do lists are made: they plan to test the different milks with different tests, e.g. test for sugars or the Woehlk test to see whether there is sugar or lactose in all milks.	List of possible experiments e-board
	Homework: do some research and find out what lactose and lactase are.	
	Teacher-Homework: Organize material for experiments and try to incorporate ideas from the students. Make sure that the materials for the next unit are sufficiently differentiated for all participating students (C-II-1 & C-III-1,5)	

Second	Second unit			
Approx.	Phases	Activity	Media/method	
3 min	Elaboration phase I (Erarbeitungs- phase I)	The teacher starts the lesson by showing two powders (lactase and lactose) and naming them lactase and lactose. A tactile option should be offered to visually impaired students, descriptions should be articulated (A-II-1 & A-III-3,4). The teacher asks the students to explain the differences, as they have understood them to be from their homework assignment.	Visualizer/camera Petri dishes with lactose and lactase Lactose and lactase in Ziplock-bags	
12 min		The students write down their information on cards (text or graphic); heterogeneous writing-pairs is beneficial. Results are discussed in the class; the meaning of important words are repeated and/or explained (examples of such words are highlighted in yellow below). Collection of facts for e-board: - Lactose is a sugar; it's also called 'milk sugar' (photograph of milk sugar-package) - Lactose is a disaccharide, meaning it is built from two monosaccharides (graphics of molecular form, different colours for glucose and galactose) - Lactase is an 'enzyme' - Lactase can split lactose - Any additional relevant information about both that can be added to a mind map	Writing-pairs Cards, pens, magnets, magnetic board (or digital equivalent) Mind map from the last unit, e-board	
10 min		While these facts are written on the e-board, the teacher uses the wording and graphics of the students (B-III-4); if the students didn't use certain relevant words or pictures, the teacher adds these to the mind map and explains them (B-II-1 & B-III-3). New words are highlighted: they should be understood by the end of the day The teacher refers to the e-board from the last unit to show the questions => combines the questions with the new facts => new synthesis is visualized on the e-board.	e-board	
		The students form concrete hypotheses with the help of the teacher and put them on the e-board, e.g.:	Plenum-discussion e-board with table for results	

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	1. lactose-free milk does not contain lactose	
	2. normal milk does contain lactose	
	3. normal milk with added lactase no longer contains lactose	
	4. plant-based milk does not contain lactose	Materials for Experiments
	5. a positive blind test containing water and lactose should turn salmon pink	
	6. a negative blind test containing water, but no lactose, should turn yellow	Worksheets with experimental
	Maybe further hypotheses, e.g.	protocols and lab reports for
	7. when lactase is added, milk tastes sweeter than before	noting individual findings
	The students decide about work tasks, e.g. who will perform which tests.	
15	The teacher has set up the results table in advance on the e-board.	
min	(Heterogeneous groups can be created, e.g. using Oncoo app); Each group does a different	Eventually Oncoo.de
	test (numbered task) plus task 0.	(prepared in advance)
	The students proceed with testing.	,
	Task 0. All groups do the negative and positive blind Woehlk test to be able to compare.	
	Task 1. Test lactose-free milk using Woehlk test	
	Task 2. Test normal milk using Woehlk test	
	Task 3. Test normal milk after adding a lactase tablet using Woehlk test	
	Task 4. Test plant-based milk using Woehlk test	
	The teacher multiplies tasks so that pupils work in pairs. For the tasks, three different	
	strengths of lactase pills may be used by different groups to make it more difficult. The	
	students fill in blanks in the table on the e-Board.	
	Groups record their results on the board when ready. Groups report their findings to others;	Group presentations
5 min	results are discussed. All hypotheses could be confirmed.	Open-class discussion
	The students should interpret their results as homework. The teacher gives differentiated	
	assignments (C-III-1,3,5; D-II-1, D-III-1):	
	Task for all:	
	Is there lactose in	
	lactose-free milk?	
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- .. normal milk?
- .. plant-based milk?

For those of the students who want a challenge:

Try to explain why.

Those students who want to continue but don't know how they can use prepared scaffolding that can be found online in school's cloud:

- a) Check results for the task that you did.
- b) Answer the question for the result of your testing.
- c) Compare your results to the other groups who did the same testing: are they alike?
- d) Are there results that differ from each other? Highlight them in the table.