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ASSESSMENT TOOL INVENTORY

urban science

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Urban Science Assessment Tool Inventory

The Tool Inventory consists of different tools either developed for formative or summative assessment or designed for (self-) reflection.

The Inventory collects tools for a variety of purposes and target groups that are summarized in the table bellow:

Competence		Dimensions	Type	Target group
science competence		formative	self-assessment	students
		formative	self-assessment	teachers
		summative	external assessment	students
sustainability competence		formative	self-assessment	students
		formative	self-assessment	teachers
		summative	external assessment	students
overall	affective elements	formative	self-assessment	students
	learning points	summative	self-assessment	teachers
	interview on piloting with modules	both	external	teachers

As seen from the table, the Inventory focuses on two main target groups: students and teachers, however many tools can be used for working with other educators too.

The objective of the tools are either to assess (inquiry-based) science competences (including science inquiry skills) or to assess sustainability competences. Many of the tools, and indeed these are the ones receiving the most positive reflections from teachers, are not specifically competence-based, but general tools of reflection or self-reflection or tools measuring (or estimating) affective elements of competences (motivation, self-efficacy, empowerment). Although tools in the latter group are not strictly competence-based, they might have an important role in discovering competence elements (both of inquiry-based science learning and learning for sustainability). One of the reasons why they were especially welcomed by teachers during the pilots could be that these competence elements are often neglected during classroom teaching and teachers often feel abandoned and resourceless to shape or develope them.

The Inventory has tools that work in two different dimensions. Some of them reflect on specific steps of a learning journey: such are formative assessment tools and reflective tools for supporting teachers in the adaptation, in the development or in the process of piloting with learning modules. Others regard the overall learning process: these are summative assessment tools including a pre-post survey.

Most of the tools are self-assessment tools, but external assessment tools and interview guidelines can be also useful. The latter group can efficiently support action research (linked to the development or the adaptation of learning modules) or other forms of collaborative development of learning

resources. These tools are also important as they provide a firm framework for reflection thus increasing objectivity during the process (and avoiding evaluation based on intuitive impressions of "what worked in class").

The table below is the Inventory itself. The tools within were piloted during the work with learning modules. It is suggested that teachers, before adapting a learning module, revise which tools are more appropriate or fit for purpose in their classes. This decision can be made considering school requirements, classroom culture and specific learning aims. In classes, for example, where student autonomy has not yet been developed, a formative peer-assessment too might be too early to introduce with a module, or the introduction of self-assessment tools might require more scaffolding (more elaborate description or instructions or direct support). Similarly, if the learning module applies a technique that would not be included in the school's culture (for example, gamification) using simple self-assessment tools (e.g. from the section 'Quick feedback') before introducing the new method would implicate more efficient classroom work.

Some tools included in the inventory assess teachers' competences. These tools are included here as during piloting, adaptation or training, they provide firm support and feedback on teachers' understanding of inquiry-based science teaching, and they can also be used for measuring their progress, which might be useful if adaptation is supported in schools by experts. Using them, teachers might reflect on their own professional learning too.

Urban Science Assessment Tool Inventory

Place in the learning cycle	Who is assessed	Tool	Purpose of assessment	Type of tool	Link
Before Stage 1 of the learning cycle	students	Motivation and self-efficacy questionnaire by Herman	to estimate the empowerment, motivation and self-efficacy of students involved in project-based science learning by their self-evaluation	self-assessment or external pre/post assessment	1

[1] https://dl.acm.org/citation.cfm?id=1150071

		KWL Grid	to find what students already know, what they would like to learn and review changes in the above	self-assessment and peer-assessment, formative	2
		Motivated Strategies for Learning Questionnaire	to assess motivation and use of learning strategies by students	self-assessment, formative	3
	teachers	Scientific thinking self-assessment tool	to support reflection on the given teaching practice by the teacher; by collecting examples or evidences	self-assessment reflective tool	4
After stage 3 of the learning cycle	students and teachers	Rubric reflection and observation tool	to provide a prepared framework to focus reflection onto specific aspects of the teaching and learning process, working together with open questions.	collaborative summative assessment	5
	students	Formative peer assessment	to provide a detailed insight to how students assess their learning	peer assessment, formative	6
	students	Student self-assessment checklist	to assess written production linked to inquiry-based / design-based learning	self-assessment checklist	7

[2] https://www.twinkl.fr/teaching-wiki/kwl-grid
[3] https://eric.ed.gov/?id=ED338122
[4] https://pure.strath.ac.uk/portal/en/publications/adding-pedagogical-process-knowledge-to-pedagogical-content-knowledge(3dadc830-bd0e-4a40-9df0-14f11238b1e2)/export.html and https://dialnet.unirioja.es/descarga/articulo/4459239.pdf
[5] https://resources.ats2020.eu/resource-details/LITR/professional-reflection
[6] https://www.celt.iastate.edu/teaching/assessment-and-evaluation/peer-assessment/
[7] http://www.teacherstryscience.org/lp/give-me-biomimetic-shelter

		IBL summative assessment tool by 5 stages	to assess students' advancement by each phase of the inquiry learning process using a 5-step model	teacher-led summative assessment	8
		Biomimicry rubric	to collect information about the advancement of students in a learning cycle	self-assessment summative assessment	9
		Teachers dialogue protocol for assessing IBL	to assess students' notions about the inquiry learning process.	dialogue, formative assessment	10
		Student-generated test questions	to check students' knowledge after a session / cycle	summative assessment	11
		Assessment Wall	to assess specific competences	self-assessment	12
		PISA	complex competence assessment	questionnaire, summative assessment	13
During piloting	students and teachers	Rubric reflection and observation tool	to provide a prepared framework to focus reflection onto specific aspects of the teaching and learning process, working together with open questions.	collaborative summative assessment	14
	students	Teachers dialogue protocol for assessing IBL	to assess students' notions about the inquiry learning process.	dialogue, formative assessment	15

[8] https://sisu.ut.ee/sites/default/files/ark/files/summative_assessement.pdf
[9] https://www.teacherstryscience.org/sites/default/files/lessonplan/resources/biomimicry_rubric.pdf
[10] https://sisu.ut.ee/sites/default/files/ark/files/dialogue_protocol.pdf
[11] https://www.prodigygame.com/blog/experiential-learning-activities/
https://schools.ednet.ns.ca/avrsb/070/tawebb/Appraisalindex/Cats/4Application/25StudentGeneratedtest.pdf
[12] https://videsizglitiba.wordpress.com/vertesanas-kriteriji/
[13] http://www.oecd.org/pisa/pisa-2015-results-in-focus.pdf
[14] https://resources.ats2020.eu/resource-details/LITR/professional-reflection
[15] https://sisu.ut.ee/sites/default/files/ark/files/dialogue_protocol.pdf

	teachers	Self-assessment or interview protocol for adapting modules	to learn teachers' view about adaptation and a module's strengths and weaknesses	self-assessment, dialogue, formative assessment	16
Quick feedback	students	Index card summaries	to support reflection on key ideas being learnt and create questions for areas where understanding in incomplete	formative assessment	17
		Muddiest point	to review points that need further clarification, correction or more elaboration	formative assessment, self-reflection	18
		Suggestion box	to review some points ("hazy" topics, top moments, general impressions – based on purpose and instruction)	formative assessment, self-reflection	19
		ABC summaries	to get quick responses of student understanding	formative assessment	20
		Blob Tree	to record feelings towards a topic	formative assessment	21
		One-Minute Paper	to identify issues/topics which are clear for the students and those which need to be revised	formative assessment	22

[16] http://spice.eun.org/c/document_library/get_file?p_l_id=16292&folderId=16435&name=DLFE-9322.pdf
[17] http://distrategykit.weebly.com/index-card-summaries.html
[18] https://www.celt.iastate.edu/teaching/assessment-and-evaluation/classroom-assessment-techniques-quick-strategies-to-check-student-learning-in-class/
[19] https://www.celt.iastate.edu/teaching/assessment-and-evaluation/classroom-assessment-techniques-quick-strategies-to-check-student-learning-in-class/
[20] https://goalbookapp.com/toolkit/v/strategy/abc-summary
[21] https://www.blobtree.com/
[22] https://oncourseworkshop.com/self-awareness/one-minute-paper/

		Chain Notes strategy	to get a quick overview of students understanding of the topic	formative assessment	23
		Application Article	to find out if students can apply knowledge and skills in practice	formative assessment	24
		Online 'quiz'	to gain quick feedback responses on learning, mainly knowledge based	summative assessment	25

[23] https://www.s2temsc.org/uploads/1/8/8/7/18873120/chain_notes_strategy.pdf
[24] https://www.celt.iastate.edu/teaching/assessment-and-evaluation/classroom-assessment-techniques-quick-strategies-to-check-student-learning-in-class/
[25] https://www.socrative.com/ and https://goformative.com/

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