





The CREATIONS definition and Workshopping Process

For the purposes of the CREATIONS project we were required to develop a word-based definition as follows:

“Purposeful and imaginative activity generating outcomes that are original and valuable in relation to the learner. This occurs through critical reasoning using the available evidence to generate ideas, explanations and strategies as an individual or community, whilst acknowledging the role of risk and emotions in interdisciplinary contexts”

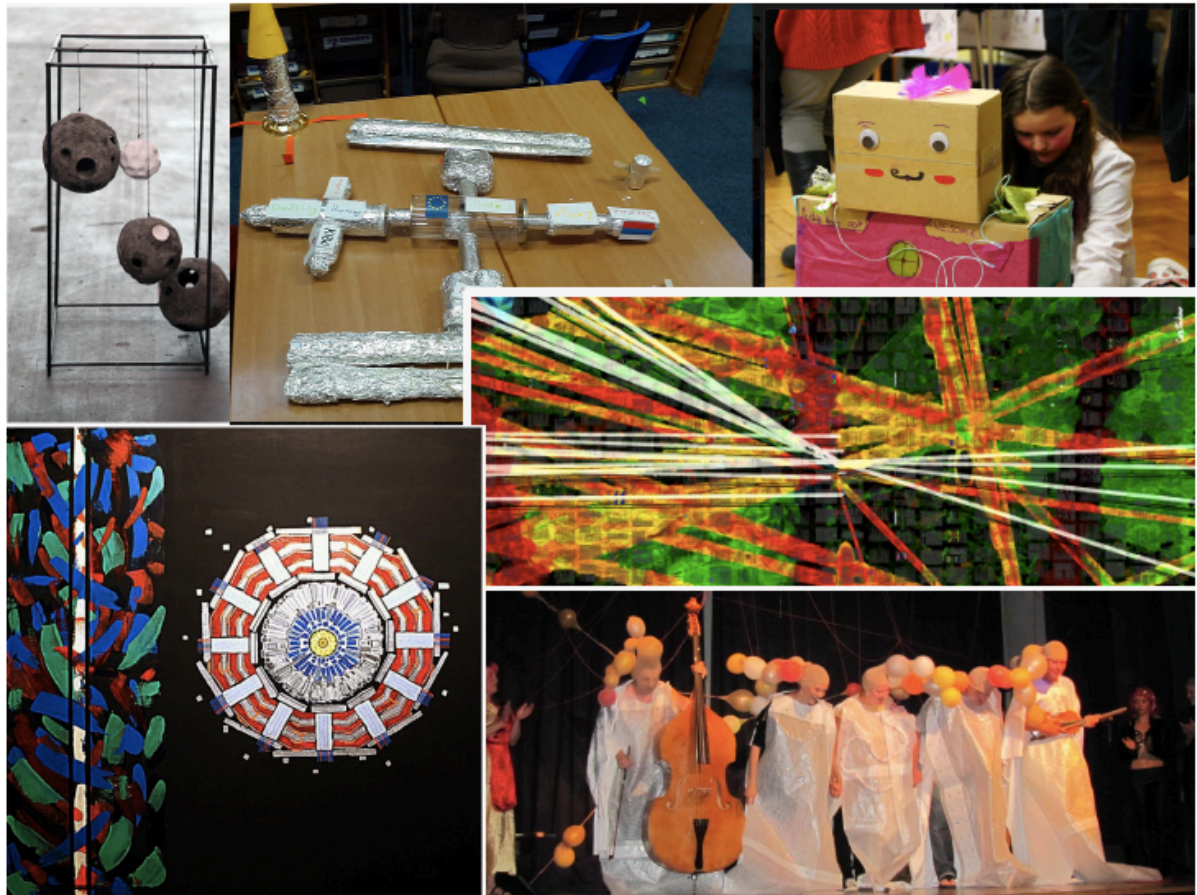
We developed it in this way because we were working on a formal literature review and we wanted to be clear about how we were defining our terms. The definition above was slightly different before we began the literature reviewing and workshopping process that made up Deliverable 2.1, and we then developed it in light of that review and workshopping events in order to come up with an overarching definition for the project. We suggest that Facilitators use the workshopping process in order to see if their, perhaps subconscious, definition of creativity fits with the one we have proposed above. The workshopping process allows for the possibility of development of the definition in different contexts too.

ACTIVITY TWO: DEFINITIONS	Amendments to the definition	Differences of opinion
	<p>Taking risks and making mistakes</p> <p>Understanding of the nature of science: can you even be creative in science?</p> <p>Understanding the history of science and creating – it's not just about facts</p> <p>'Awesomeness' of science</p>	<p>Ideas can't be separated out: they are intertwined</p> <p>They could be separated into cyclical/ongoing and cerebral/practical</p>
		

Different examples of how the definition was workshopped

For some people representing creativity in words might be antithetical to the fact that creativity is a process and is alive in practice. For this reason, we also offer an image montage below. It is made up of images drawn or taken by people from various disciplines, which show how they would represent creativity, as well as images of the creative process in action from different CREATIONS science education demonstrators that already exist.

For further information on these resources please contact Dr Kerry Chappell K.A.Chappell@exeter.ac.uk



Montage of images from various demonstrator projects

You might decide to work with the images in the same kind of workshopping process as the words above. You could ask yourself questions such as: what image sums up creativity in science education for me? What can I see in the images here that make me think something creative is happening? What does this make me think about my own creativity in science education practice?

We would be very interested to hear the outcomes of any workshopping activities. (Please feel free to photograph your outcomes and post them in the on the CREATIONS website or share with the contact below with your comments.)

The full workshopping process can be found below.



CREATIONS: Workshop Guidance

These activities draw on the idea of the workshop creating a living dialogic space via creative learning conversations in which all participants are listened to and have a voice.¹ This approach has been used in order to model the kind of facilitation and pedagogy that the CREATIONS project itself is aiming to encourage. Each workshop should contain 15 – 20 people from across the target groups. A digital recording sheet has been provided; please input data directly into this sheet, including photos where possible.

Information gathered in the workshop will be used to inform the writing of a CREATIONS report; participants can have access to the information gathered if they so wish. Please make sure you tell the participants this at the beginning of the session, and ensure you take contact details where appropriate.

Aim: to get people thinking and talking about:

- what creativity in science education is for them
- what initiatives they are aware of that they think achieve this and engage students via different means including the arts and culture
- what pedagogies they think are key to this

1 Warm up (20 mins)

- 1 Please sit down at your table (suggestion is 4 – 5 people around a table) organising yourselves in alphabetical order around the table according to your first name
- 2 Once you're sat down please introduce yourself and say ONE sentence each about your role in relation to science education
- 3 Temperature taking - see the middle of the table as very hot/positive and the edge of the table as very cold/negative. Place your hand on the table in terms of how positive/negative you currently feel about the state of creativity in science education. Briefly share your reasons for where your hand is.

Facilitation: keep people to one sentence for the first part of this task otherwise it will take too long. Keep discussion for 3 focused on why they put their hand where they did – this does not need to be done individually but can be done in clusters – taking examples of reasons from those who are near the centre/further away from the centre.

Documentation: The facilitator should take a photograph of where the hands are placed and note key examples digitally on the documentation sheet.

2 What is creativity in science education? (20 mins)

In groups of 4 – 5 workshop participants rank or arrange key elements that make up the definition of creativity in science education. Remember the definition will be used across Europe, across primary and secondary education so it needs to be abstract enough to encompass multiple forms of practice. The current suggestion from the end of the CREAT-IT project is:

¹ Chappell, K., & Craft, A. (2011) Creative learning conversations: producing living dialogic spaces. *Educational Research*. 53(3) pp. 363–385. This workshop process has been designed by the University of Exeter CREATIONS team. For further information please contact Kerry Chappell or Hermione Ruck Keene: k.a.chappell@exeter.ac.uk or H.RuckKeene@exeter.ac.uk

"Purposive and imaginative activity generating outcomes that are original and valuable in relation to the learner. This occurs via generating ideas and strategies as an individual or community, reasoning critically between these and producing plausible explanations and strategies consistent with the available evidence".

Elements separated out on slips of paper are:

Purposive and imaginative activity

Outcomes that are original and valuable in relation to the learner

Generating ideas and strategies

Individual and community

Reasoning critically between ideas

Producing plausible explanations and strategies consistent with the available evidence

Conclusion of activity - How close does each group feel the creativity in science education definition is for them?
What amendments, if any, would they make?

Facilitation: this needs an envelope with the words below written on slips of paper, as well as some spare slips – the aim is to allow everyone in the group a voice – techniques to help this include asking each person to read out an element of the definition, and working round the group asking people to contribute briefly in turn rather than having an open floor speaking policy, where more dominant voices may take over. Re ranking or arranging, participants may want to place the elements in a top down list, spanning out from a central point where centre is most important – this is open to interpretation by the group.

Documentation: The facilitator should take notes, digitally on the documentation sheet, regarding major amendments to the definition being offered. They may also wish to note any major differences of opinion. And also take a photograph of the final arrangement of the elements of the definition.

3 Initiatives in creative science education (20 minutes)

Working digitally in pairs or threes, participants share examples of good practice re creativity and engagement in science education under the following headings:

IBSE or inquiry-based

Arts or culture-based

Others?

For each initiative, need to clearly obtain:

Name

Web address

Any particular science focus

Other disciplinary/cultural/digital elements

Bearing in mind the definition above – why do they think the initiative is:

1. Creative
2. Leads to better engagement in science education

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Facilitation: encourage participants to talk and record their discussions in pairs for 10 minutes either on their own laptops/tablets or on paper and then take a photograph, and to highlight one initiative from their discussion which they think is most creative and engaging in terms of science education. For the last 10 minutes of this task the pairs share their chosen initiative with the group. Be clear that the information shared in this section can be made available to participants soon after the workshop.

Documentation: The facilitator should make sure whatever digital tool is being used that all elements are recorded for each pair where necessary to save them having to chase up key details later.

4 Pedagogies in creative science education (25 mins)

Participants work in 5s. Working with the metaphor of the creative process in science education as a journey, ask each 5 to draw a large vehicle of their choice on a piece of flipchart paper (bus, bicycle, aeroplane etc). Then ask them to use the 8 provided post-it notes to annotate the image with the key pedagogies for the creative process in science education. Provide spare post-it notes for them to add their own pedagogies too drawing on their own practice or theoretical knowledge. The CREAT-IT principles will need explaining before they begin. Use the first 15 minutes to explain the pedagogies and have them develop their image/post-its. Use the last 10 minutes for the groups to briefly share their positioning of the CREAT-IT pedagogies, their new pedagogies, journey end and break downs.

Facilitation: You will first need to explain the 8 CREAT-IT pedagogic principles (details attached). For the annotation exercise, prompt questions might include – Which pedagogies are the engine of creativity in science education? What pedagogies do you need in your boot to bring out when appropriate? Who are the key people in the vehicle that you're using the pedagogies with? Is there anything else that you might want to have on the journey e.g. on the roof rack? What might cause you to break down on your journey (encourage them to draw this as well as write)? Dependent on your group and cultural context, you may wish to develop your own metaphor for this exercise which encourages people to discuss and document the 3 key elements re their opinion of the principles, any new pedagogies and any issues that they raise.

Documentation: The facilitator should make digital notes either during or after the workshop picking up on key discussion points including:

- *whether all groups are able to place all 8 CREAT-IT principles*
- *what new pedagogies each group adds (including key references where appropriate)*
- *and what breakdown causes are.*

Please also take a picture of each piece of flipchart paper.

5 Wrap up (5 mins)

Thank all participants for their contributions. In a circle, or arrangement where everyone can see each others faces ask all the participants to offer one word summing up how they have felt about the workshop, and one sentence saying what they will take away from it.

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Documentation sheet: Please remember to record for all groups in relation to each activity – please save this sheet as a separate document for each workshop that you carry out. Boxes will expand as you type into them.

Workshop facilitator:	Workshop date, time and venue: Number of participants: (Please also complete the separate sheet detailing participants names and categorisation)	
ACTIVITY ONE: WARM UP	Record reasons for the placement of hands 	
ACTIVITY TWO: DEFINITIONS	Amendments to the definition	Differences of opinion
ACTIVITY THREE: INITIATIVES	Workshop participants should record their ideas digitally – either on their own laptops/tablets or on paper and then take a photograph. Please transfer their ideas to this column or include them as a separate document.	

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ACTIVITY FOUR: PEDGAGOGIES	Key discussion points <ul style="list-style-type: none"> ○ <i>whether all groups are able to place all 8 CREAT-IT principles</i> ○ <i>what new pedagogies each group adds (including key references where appropriate)</i> ○ <i>and what breakdown causes are.</i>

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Resources:

Flipchart paper

Post-its

Coloured pens

Ranking statements – to be printed and cut out x 4 for use by up to 4 groups

Purposive and imaginative activity

Outcomes that are original and valuable in relation to the learner

Generating ideas and strategies

Individual and community

Reasoning critically between ideas

Producing plausible explanations and strategies consistent with the available evidence

CREAT-IT principles – see following page

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CREAT-IT Pedagogical Principles

Professional wisdom is respected and encouraged across the principles: it is vital that the approach recognises practitioners' wealth of teaching and discipline knowledge and expertise. This is a deeply contextualized knowledge often informed by intuition, which needs to be in constant conversation with science ideas and theories. The connected principles are as follows:

1. **Individual, collaborative and communal activities for change:** practice can allow for all three ways of engaging in activities, and particularly in relation to communal engagement can take advantage of the shared identities within which participants will work, allowing for difference but with a shared creative process and purpose.
2. **Risk, immersion and play:** allowing for these three processes to filter across learning and recognize how pedagogy can assist in creating literal space as well as 'thinking' space for these to occur.
3. **Dialogue:** practice can allow for dialogues between people, disciplines, creativity and identity, and ideas. This dialogue needs to acknowledge embodiment (i.e. dialogue is not simply a verbal activity) and difference and allow for conflict and irreconcilable difference. It is important to facilitate open discussion of the questions generated by pupils (bottom up) and bring these into dialogue with live questions from professional science and science education (top down).
4. **Interrelationship of different ways of thinking and knowing:** the pedagogy allows space for different ways of thinking (e.g. problem-finding, problem-solving, exploring, rationalizing, reasoning, reflecting, questioning, experimenting) focused around shared arts/science threads or throughlines. At the arts/science interface it can also offer the space for three different ways of knowing (knowing that - propositional knowledge, knowing how - practical knowledge, knowing this - aesthetic or felt knowledge), as well as acknowledging the embodied alongside the verbal.
5. **Discipline knowledge:** understanding the importance of allowing space for the rigorous discipline knowledge of both the sciences and the arts is vital, as well as understanding the importance of materials relevant to those disciplines (e.g. their bodies, with props, with paper and pencil, with sculpting materials, with Bunsen burners and test tubes, with chemicals, with equations) and how creativity might interact with these disciplinary knowledge bases differently, albeit in the context of science education.
6. **Possibilities:** – practice can allow for multiple possibilities both in terms of thinking and spaces, and know when it is appropriate to narrow or broaden these
7. **Ethics and trusteeship:** adult professionals and learners consider the ethics of their creative science processes and products and be guided in their decision-making by what matters to them as a community, acting as 'trustees' of that decision-making and its outcomes.
8. **Empowerment and agency:** through empowering pedagogies, CREAT-IT can allow both learners and adult professionals to gain a greater sense of their own agency and ability to express themselves, and to then know what to do with that in order to be more creative scientists and to develop more creative science teaching techniques. Enabling pupil agency and encouraging children to try out (and critique) their own ideas in investigations were also key factors to emerge from the survey, thus emphasizing the importance of this principle.

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