

Assessing Creativity:

A palette of possibilities



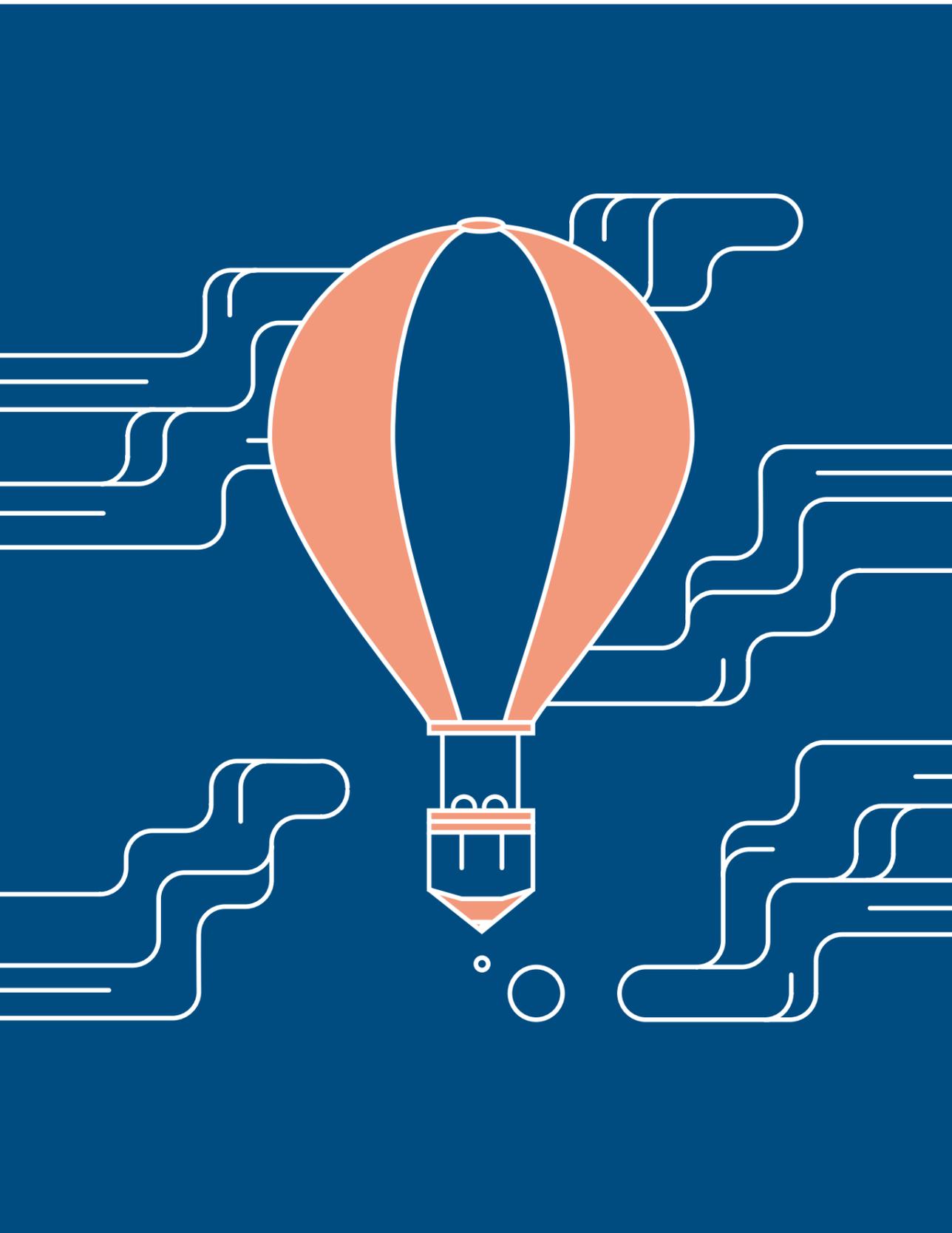


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Foreword

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At the LEGO Foundation, we believe that all children are born with the capacity to become creative, engaged, lifelong learners. They have a natural, hands-on, minds-on approach to learning, and their creativity can be nurtured and grown through play. For us, this comes with a profound responsibility to build a future where children's creativity can flourish, and where they are empowered to engage in playful learning processes that weave creativity together with the breadth of skills (including cognitive, social, emotional and physical skills) that are needed in a constantly changing and challenging world.

But in the creative education systems we hope to develop – like those envisioned by policy makers in our series **Creativity Matters** – how are we to know that we are progressing towards our goal? When and how will we know whether our work is nourishing the development of children's creativity?

The short answer is that we must be able to assess children's creativity in some way. This idea is controversial: for some, the very combination of the terms 'assessment' and 'creativity' can seem contradictory. However, if we want to know whether we're actually doing our best to support children, we have to be able to observe progress and wrestle with this seeming paradox.

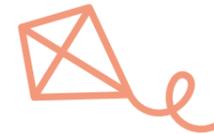
That's why it is critically important to have conversations such as those facilitated in this collection of essays. We must consider the full range of possibilities for assessing children's creativity, asking ourselves how we can nurture their creativity through assessments, how children's perspectives of creativity can be included in our evaluations, and how we can responsibly match the most appropriate measures with our specific purposes.

We want to thank the contributors to this collection for sharing their thought-provoking and considered perspectives on the important challenge before us. Children deserve our full support to nurture their creative potential; to get there, we need courageous voices such as these to spark a fruitful dialogue on assessment. We hope that this collection of essays will nourish and grow our collective understanding, provide new inspiration, examples and tools, and allow us to observe the creativity of children growing before our eyes, in order to create a better world for everyone.



Introduction

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Beyond the assessment debate

Can creativity be assessed? If it can, should it be? Will attempts to assess creativity in education systems negatively affect its development in children?

When the topic of creativity assessment is introduced, conversation inevitably turns to important questions such as these. It's easy for these conversations to become polarized: many people have strong opinions about assessment, particularly standardized assessment, and many have equally strong opinions about whether creativity can (or should) be measured in this way. It's critical that we take the time to define our terms. Rather than focusing on the yes-or-no questions above – in effect transforming the conversation into a debate – we might ask questions that allow a more nuanced dialogue, such as: What exactly do we mean by assessment? Are there certain aspects of creativity that are more susceptible to assessment than others? Are there certain approaches to observing, documenting and measuring that are more and less appropriate for a construct such as creativity? Can some approaches to assessment actually *support* the development of creativity in children?

Why now?

It is more important than ever that we are able to have a nuanced and productive conversation about creativity assessment, because the Programme for International Student Assessment (PISA) has selected Creative Thinking as the innovative domain for the 2021 testing cycle¹ – in other words, the creative thinking of teenagers around the world is about to be measured, and likely compared.

The selection of creative thinking for the 2021 PISA has a significant message: it signals that creativity

has growing importance and value internationally, and that education systems around the world may consider prioritizing it, if they have not already done so. This moment, when creativity is being brought onto the international stage in such a profound way, is one of opportunity, when policy makers, educators, researchers and creators can come together to have a productive (and perhaps even creative) discussion about the role of creativity for our children, in our schools and in our societies. However, this can only happen if we approach the conversation with an openness to nuance, a rejection of polarization and a desire to learn.

A palette of possibilities

In this collection, we present a series of essays expressing a range of thoughtful perspectives on the assessment of creativity. In doing so, we hope to demonstrate the wide range of reasonable viewpoints that exist on this topic. Our authors address a set of questions that we believe will spark fruitful conversation, by challenging readers to re-examine what they think they know about the assessment of creativity.

In the first section, Nathaniel Kendall-Taylor, of the FrameWorks Institute, responds to the question, '**Why do the ideas of assessment and creativity seem so incompatible?**' Based on cultural research, he posits that, for many people, the mental models they hold of assessment and creativity do not mesh. He argues that, by reframing the conversation in a way that bypasses these default mental models, we may be able to engage other, more compatible, understandings of these issues, and have a more productive dialogue.

In the second section, the authors respond to the question, '**How can assessments be used to cultivate**

creativity?' First, Carla Rinaldi, of the Reggio Children Foundation, discusses documentation as an approach to creativity assessment that respects the unique nature of children's expression and nourishes its development. Next, Ronald Beghetto, of Arizona State University, describes how making minor changes in existing curricula and classroom assessments can open up the possibility of evaluations that cultivate, rather than just evaluate, students' creativity.

In the third section, the contributors respond to the question, '**How can children's perspectives of creativity inform assessments?**' First, Natalie Rusk, of MIT Media Lab's Lifelong Kindergarten Group, considers the problematic appeal of automated assessments of children's creations, using vivid examples of individual Scratch projects. Next, Justine Howard, of Swansea University, explores

whether children's own understanding of creativity may differ from those of the adults who assess them, and how children's views of creativity can inform and transform creativity assessment and practice.

In the fourth and final section, the authors respond to the question, '**What do traditional creativity assessments measure, and how?**' First, Baptiste Barbot, of UCLouvain, and Todd Lubart, of Université Paris Descartes, describe the importance of the frame of reference in creativity assessments. They argue that the only way to really understand

a person's creativity is to consider both that individual's creative development over time, and how that person's creativity compares with the creativity of his or her peers. Next, Bonnie Cramond, of the University of Georgia, argues that each of the many existing creativity assessments have their own value and limitations, and that none can capture creativity perfectly. She also shares an extraordinary online resource to help readers identify the measures that align best with their assessment needs.

Painting a new picture

Looking across this spectrum of thought-provoking new perspectives on the assessment of creativity, it is clear that there is a fruitful and diverse conversation to be had beyond the traditional, polarized arguments surrounding this issue. The typical picture painted of the creativity assessment debate is black and white, but these essays demonstrate what a rich palette of possibilities is available to us. There may not be one right or perfect way to assess creativity; instead, as the world begins to grapple with the question of how, whether and what to assess in children's creativity, this collection reveals that there is an approach to suit many different purposes, contexts and value systems.

Footnotes

¹ Every three years since 2000, the Organization for Economic Cooperation and Development (OECD) has administered PISA, an international evaluation of 15-year-old students' performance in the three domains of maths, science and reading. The outcomes are meant to be comparable across years, as well as across countries, so that policy makers and educators can work to improve their education policies and practices over time, and learn from the policies of other countries. PISA also explores a fourth 'innovative domain', which is distinct for each testing cycle. Past explorations have included Collaborative Problem Solving (2015) and Global Competence (2018).

SECTION 1



Why do the ideas of assessment and creativity seem so incompatible?



CULTURAL CLASH: Why 'creativity' and 'assessment' seem contradictory, and how we can bring them together

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FrameWorks Institute

Introduction

Why is it so hard to engage with the idea of 'assessing creativity'? Why, for so many, does the combination of these words register as a bewildering contradiction? Part of the reason we struggle to bring assessment and creativity together in practice is because we struggle to bring them together in mind. Our mental models of creativity and assessment do not mesh.

These models, built over time by our experiences and by our culture, are what allow us to process an almost infinite variation of experiences and information.

"Our mental models of creativity and assessment do not mesh."

From the time we are born, we try to make sense of the world, and gradually find patterns and develop strategies for interpreting what we encounter. These working models allow us to move through the world, making meaning as we go rather than getting stuck on one particular variation on our

experience. But there's a drawback: by filtering out variations that are exceptions to the rule, we limit our view of certain dimensions, and this can keep us from seeing connections between concepts.

Perhaps the answer is to reframe the way we talk about these issues. Can we find another way into this conversation, one that bypasses our

default mental models, and engages alternative understandings of these issues? If so, we may be able to better appreciate, engage with and apply the relationship between creativity and assessment. The first step is to get a better sense of how our mental models are getting in the way.

Cultural models of assessment and creativity

At the FrameWorks Institute, we study how culture shapes people's understanding of social and scientific issues, and how the way we communicate influences perception and behaviour.

My analysis of North American¹ cultural models of assessment, described below, is the result of a series of studies that FrameWorks researchers conducted on public thinking about assessment issues over an almost three-year period, using both qualitative and quantitative methods.²

My analysis of cultural models of creativity rests on a less rigorous basis. Two streams of data inform this discussion. First, we rely on FrameWorks research on how our North American respondents think about skills and learning, and scientific enquiry. This tells us something about how people think about creativity, if somewhat indirectly. Second, I rely on an article written in 2018 by Vlad Petre Glăveanu, in which

the author conducts a cultural-historical analysis to identify three dominant ways of thinking about creativity (Glăveanu, 2018).

For this reason, my analysis of the ways in which models of assessment and creativity intersect is largely an educated, but conjectural, hypothesis. Similarly, the conclusion of the paper is interpretive; there I suggest a set of promising strategies for addressing the clash between the ideas of assessment and creativity, a clash that is currently keeping us from bringing the two together in a rich and meaningful way.

Assessment

FrameWorks Institute's studies on the cultural models of assessment in the US (2012) revealed several insights. Generally, we found that Americans believe:

- **Assessment is measurement against a standardized outcome.** Americans share an implicit understanding of how assessment works: a desired outcome is established, and an individual is assessed by comparing their performance to that standard. This cultural model was apparent, in that people focused overwhelmingly on summative assessments and standardized tests. Assessment was criticized for failing to account for individual differences in learning styles or experiences.
- **Assessment is rigid and fun-sapping.** People shared a strong assumption that assessments must be followed rigidly and that as a result, assessments are neither fun nor engaging.
- **Assessment is a tool to determine winners and losers.** There was also a shared assumption that assessment is a necessary means of differentiating high- and low-performing students. This is based on a deeper understanding that education is a competition in which only some can 'win'. This way of thinking about assessment prevents people from seeing assessment as a means of improving educational processes and outcomes for all.
- **Feedback advances learning.** Alongside these dominant models, there was a more 'recessive'³ understanding: there were occasionally discussions of the importance and role of

'feedback' in the learning process. While participants never called this 'assessment', they discussed the importance of in-the-moment input to the learning process, which appeared to correlate with what experts would describe as 'formative assessment' and thus of interest to those working on assessing creativity.

Creativity

Based on the above, we can conjecture that Americans likely hold the following cultural models of creativity:

- **Creativity is about novelty.** One of the most dominant understandings of creativity is that it is about generating novel products and ideas (Glăveanu, 2018). Alongside the assumption of novelty lies an understanding that to be creative, the thing that is generated should be of some utility.
- **Freedom is compulsory.** Americans also share an understanding that creativity requires freedom, and takes place when people are not bound or impeded by the normal mental constraints of task-directed work or timelines and do not have their attention distracted by more mundane considerations.
- **Creativity is an innate trait.** Creativity is clearly depicted as something that an individual has or doesn't have, or something that an individual is or isn't; it is not discussed as a capacity that can be trained or a skill that can be improved (other than by providing an already creative person with the space and freedom to exercise his or her creative attributes).
- **Creativity is personal and mysterious.** Creativity is also regarded as highly personal, individualized and intangible. One person's creativity or creative process is not another's and, therefore, creativity is difficult to describe in generalized terms—and people don't think that it should be.
- **Creativity as problem-solving.** A more recessive model of creativity is that it is synonymous with problem-solving (Glăveanu, 2018). Americans implicitly understand that the process of solving difficult problems requires the generation of novel approaches and solutions.

How culture clashes

The cultural models people have for particular issues, such as assessment and creativity, affect how they are able to bring them together in mind and practice. There are three major ways that understandings of assessment and creativity are likely to clash:

- 1. Creativity as novel vs. assessment as standardized.** The model of assessment as standardized is in direct opposition to the understanding of creativity as novel. How can you have a standardized way of looking at something that is, by its very definition, a departure from what currently exists?
- 2. Creativity as free vs. assessment as rigid.** Assessment is understood as rigid, serious and the opposite of fun, features that are seen as a threat to the freedom and lack of inhibition that are preconditions for creativity.
- 3. Creativity as innate vs. assessment as a tool for improvement.** The third clash lies between the way those in the field of assessment describe the concept, and the way that the public thinks about creativity. If assessment is described as a way to improve learning and skills, but creativity is understood as an innate individual trait, there is little utility in thinking about assessing creativity.

How to recast the clash

Framing is the process by which the choices we make in presenting information affect the perceptions and behaviours of others. Frames are cues that activate and draw forward specific cultural models that in

“How can you have a standardized way of looking at something that is, by its very definition, a departure from what currently exists?”

turn shape how we see and understand something. Reframing creativity and assessment could shift public understanding of these concepts in ways that allow for better synergy between them. While we have not conducted research on how to effectively

frame a union between assessment and creativity, the analysis above suggests several possibilities.

- 1. Activate the ‘feedback’ model of assessment.** Americans have a promising recessive model for thinking about assessment: assessment as feedback. If communicators can activate and, over time and through repetition, strengthen this way of thinking, people may find it easier to grasp, value and support the idea of assessing creativity.⁴
- 2. Creativity as problem-solving.** The problem-solving model of creativity offers an entry point for those whose default understanding of assessment is as a process of establishing an outcome and measuring progress towards this outcome. Once communicators activate this particular understanding of creativity as a way to make connections with and points about assessment, they may be able to then add other aspects of creativity (novelty and generation) into the conversation.
- 3. Framing in both directions.** Establishing a productive frame for work on assessment and creativity will likely require framing both concepts. In other words, it may require establishing a feedback understanding of assessment and activating a problem-solving understanding of creativity to allow people to most productively synthesize these currently clashing concepts.

In addition to activating recessive models of creativity or assessment (or both), there is another promising strategy communicators can use to help unify them. People may lack a mental image of what the proposed relationship looks like or how it works, so a bank of concrete examples could be powerful. This has been an effective strategy in similar reframing work on informal STEM learning (2015).⁵ The examples must be concrete, feasible and explanatory (i.e. must be things people have touched and experienced, or can see as possible, and must explain how an action leads to a change in outcomes).

Another approach might involve designing and testing metaphors that recast assessment, creativity, or both, in ways that establish more



productive understandings.⁶ For example, for assessment, communicators might test the metaphor of cooking – in which a cook tastes a dish regularly during the cooking process, adding ingredients and changing the heat as needed – to activate a more formative, iterative understanding of assessment into which ideas of creativity can better fit. For creativity, it might help to draw a comparison to other skills that people already see as emergent and developing, such as learning a language or strengthening a muscle over time, in order to widen the current understanding of creativity beyond the idea of an innate trait.

Conclusion

A closer look at culture can help us make sense of why bringing some ideas together can prove so difficult and frustrating. In this case, assessment and creativity are connected to strong underlying assumptions and patterns of thinking that don't fit neatly together. Alternative ways of framing could unlock the potential to use assessment to improve creative processes, skills and outcomes.

Much of the discussion here is conjectural and where it is empirical, it is based on geographically specific

samples. There are three areas where additional work is particularly important:

1. There needs to be empirical work on both public and audience-specific understandings of creativity, and on how thinking about creativity comes into the conversation when thinking about assessment.
2. There needs to be more work exploring promising ways of framing the discussion about assessing creativity. It is important that these potential frames are tested empirically before being widely adopted to determine their effects.
3. Both of these areas of research need to be conducted in a variety of contexts beyond the United States, as there are likely significant variations in how people across cultures think about both assessment and creativity, let alone how these concepts come together and can be effectively framed.

Understanding how culture shapes how we think can help us understand the problems we face in integrative work; it can also inspire new ways of

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reframing issues that can open up a more positive dialogue. It is possible to have a productive conversation about assessment and creativity, one that allows us to do the important work for children that needs to be done — we just need to find the right story and stick to it.

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Footnotes

¹ The discussion that follows is US-centric. This is simply because the weight of data available to me is tipped towards the US context, where most of my work for the last 12 years has focused.

² In 2012, the FrameWorks Institute conducted research to explore public understandings of assessment. This was part of a larger project that looked across multiple domains of education reform. A more extended presentation of this work can be found at: <https://frameworksinstitute.org/pubs/mtg/assessment/Part1-15.html>

³ Receptive describes a model that was not as frequently used, not as top-of-mind, and not as strong in its ability to shape thinking.

⁴ This type of framing has been successful for other issues, such as poverty in the UK, where highlighting the ways in which context shapes the resources available to individuals has proven powerful in directing thinking away from individualistic concepts of 'deservingness'.

⁵ The problem was not that people were opposed to children learning STEM in informal contexts; it was that they had few easily accessible images to help them imagine what this looked like. We found that using examples was powerful in improving people's understanding of the benefits of informal STEM learning and generating measurable increases in support for public funding for informal STEM learning and specific pieces of STEM policy.

⁶ Examples of this type of strategy include FrameWorks' development of the brain architecture metaphor with the National Scientific Council on the Developing Child and the Harvard Center on the Developing Child. This metaphor has supplied a new way of thinking about early brain and biological development and in so doing, has fundamentally changed the policy context.



SECTION 2

How can assessments be used to cultivate creativity?



DOCUMENTING CREATIVITY: Seeking meaning in life

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 In collaboration with
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The LEGO Foundation

Is there anything more creative than making meaning?

This is a freedom that belongs to all of us: To make meaning, to search for the meaning of life.

We ask how we can assess creativity, but what is at stake in this question? It is not just about choosing a pedagogical approach, or choosing the best assessment tool; it is, fundamentally, about choosing whether we allow or deny other humans – regardless of their age – their freedom, their inherent right, to search for the meaning of life.

The child as competent and creative

Each child is absolutely singular, completely unique, and will not appear again for eternity. Each one is distinctively and perfectly precious, each an inheritor of thousands of years of human history. We know that children think in creative ways; there

“Our ethical responsibility, then, to children’s beautiful uniqueness, is to listen and observe carefully for the way that they themselves express their creativity – not to determine it for them.”

is no question of this. They are born creative. Our ethical responsibility, then, to children’s beautiful uniqueness, is to listen and observe carefully for the way that they themselves express their creativity – not to determine it for them.

At Reggio Emilia we hold an understanding of the child as competent in learning from the moment of birth. Children are born with many tools to explore their world: they are born with wonder, curiosity, with love and the desire to live. And they are born with creativity. Children, freer from given rules and preestablished solutions, are the generators *par excellence* of new ideas and creative thoughts. When they encounter a new object or material, in their face and body we can see that they ask, “What is the meaning of this?” They naturally explore it, trying it out in many ways. To us, the adults, there may be one answer to their question, but for them there are still many possibilities, and they try them all. Creativity – the process of making connections, exploring, and transforming the world in ways that are new and meaningful to them (The LEGO Foundation, 2019) – is an indispensable tool for them in interacting with and making meaning in the world.

When we acknowledge the enormous competency with which children are born, what is revealed is a child no longer considered only weak, unfinished, incapable – the citizens of tomorrow; instead we see a child asking us to be looked at with different eyes, a child with wisdom and understanding, with an important and unique perspective to share, and with something to teach us – we see citizens of today with a great deal to offer society now.

Creativity and meaning making

Learning is, by definition, a creative act. When children learn, they deconstruct the object of knowledge, and then assimilate it by reconstructing it according to their own mental structures; that is, they grasp the material by regenerating it for

themselves in a new and unusual way. In this sense, creativity cannot be separated from thinking; in fact, it is an essential characteristic of human thinking. It is a capacity, not a talent, and can be developed and cultivated in environments that support divergent thinking. Creativity is about thinking as water is about life: it is an essential part of it. It cannot be taught; it can only be nourished and cherished.

When children arrive in the world, they have many tools, but they do not yet have context. Education, then, is about creating a connection for them to the world, to allow them to use their tools, like creativity,

to discover the world and express their uniqueness in it. As we have said elsewhere (Giudici, Rinaldi, & Krechevsky, 2001), we see the child as one “to whom we must offer

many opportunities so that each and every child can find possibilities for his or her individuality and subjectivity to be expressed, enriched, and

developed. School, therefore, is viewed as a very important place, a decisive place for giving all those involved the possibility to be themselves, in the rich originality and wholeness of each individual.” This is why the choice of a child’s school is so critical to their development.¹

Creativity is also an interactive, relational, and social project. At school, creativity should be able to be expressed in all places and at all times: there is no such thing as a creativity class, but instead a creative context that supports it. Children must be offered experiences where they can be enriched by comparing different points of view, by interacting with their peers, and with others in a broader sense. This allows them to sharpen the creative and critical thinking skills they use to analyse and evaluate many possible solutions for a given problem, to recognize solutions in original thoughts and objects, to propose innovations and changes, and to shape and adapt their acquired knowledge to the various contexts that arise in the course of life.

“Learning is, by definition, a creative act.”





IT

Il bambino

è fatto di cento.
Il bambino ha
cento lingue
cento mani
cento pensieri
cento modi di pensare
di giocare e di parlare
cento sempre cento
modi di ascoltare
di stupire di amare
cento allegrie
per cantare e capire
cento mondi
da scoprire
cento mondi

da inventare
cento mondi
da sognare.
Il bambino ha
cento lingue
(e poi cento cento cento)
ma gliene rubano novantanove.
La scuola e la cultura
gli separano la testa dal corpo.
Gli dicono:
di pensare senza mani
di fare senza testa
di ascoltare e di non parlare
di capire senza allegrie
di amare e di stupirsi
solo a Pasqua e a Natale.

Gli dicono:
di scoprire il mondo che già c'è
e di cento
gliene rubano novantanove.
Gli dicono:
che il gioco e il lavoro
la realtà e la fantasia
la scienza e l'immaginazione
il cielo e la terra
la ragione e il sogno
sono cose
che non stanno insieme.
Gli dicono insomma
che il cento non c'è.
Il bambino dice:
invece il cento c'è.

EN

The child

is made of one hundred.
The child has
a hundred languages
a hundred hands
a hundred thoughts
a hundred ways of thinking
of playing, of speaking.
A hundred always a hundred
ways of listening
of marveling of loving
a hundred joys
for singing and understanding
a hundred worlds
to discover
a hundred worlds

to invent
a hundred worlds
to dream.
The child has
a hundred languages
(and a hundred hundred hundred more)
but they steal ninety-nine.
The school and the culture
separate the head from the body.
They tell the child:
to think without hands
to do without head
to listen and not to speak
to understand without joy
to love and to marvel
only at Easter and at Christmas.

They tell the child:
to discover the world already there
and of the hundred
they steal ninety-nine.
They tell the child:
that work and play
reality and fantasy
science and imagination
sky and earth
reason and dream
are things
that do not belong together.
And thus they tell the child
that the hundred is not there.
The child says:
No way. The hundred is there.

^ Loris Malaguzzi, *Invece il cento c'è / No way. The hundred is there*. Translated by Lella Gandini. From Loris Malaguzzi et al., *The Hundred Languages of Children*, exhibition catalogue, Reggio Children, Reggio Emilia, 1996
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Assessing creativity through documentation

It is clear that children are creative. So when we assess creativity, it should not be with the question, "Is this child creative?" but instead, "In what ways is this child's creativity expressed?"

There is a problem, then, related to evaluation. While convergent thinking is expressed in the search for a single, conventional, and correct solution, and is therefore predictable and measurable, divergent thinking is unpredictable, original, unique, and unrepeatable. Divergence explores the palette of

possibilities, and the quality of the process is decisive. It is crucial to grasp the stream of thoughts, the originality of the contributions, and the pulsing of ideas that are compared. The

child has 100 languages (Malaguzzi, 1996) – ways of thinking, expressing, playing, and understanding – and to pre-determine the one we will measure, the one they *must* use in order to be made visible to our scheme, is to steal away 99 of those languages. It is to deny them their freedom and their right to make meaning of the world and of life in their own unique and meaningful way.

The creative process, its quality, and its continuous change require an evaluation tool that is part of the very learning process, that modifies and supports it: DOCUMENTATION.

Documentation looks for creativity in the child's own language. It is a "visible listening," a construction of recorded traces of a learning moment, which not only witness and record children's play-learning paths and processes, but also *make them possible*. Rich documentation (such as videos, recordings, photographic material, written notes, etc.) is realized and used *while the experience is carried out*, becoming an inseparable part of it:

- it makes the learning processes and strategies that each child uses visible, thus making subjective and intersubjective processes the shared heritage of the group;

- it creates traces of this learning moment to remain for others, so they too may be changed by it in the future;

- when displayed and shared, it becomes a "place" for the exchange of reflections among children and also adults, of dissemination and of convergence, and therefore of creative thinking;

- it provides the opportunity, over time, to reread, revisit, and evaluate the experience, actions that become an integral and indispensable part of the learning process;

- and it can modify learning by encouraging self-evaluation and self-reflection (see [Beghetto](#), this collection).

Documentation also shifts the learning moment into a different language, allowing the children to see not only the differences among themselves but also the differences between the media and languages they encounter (verbal, graphic, plastic, musical, gestural, etc.) – and it is in the transfer from one language to another, as well as in their mutual interaction, that the creation and consolidation of concepts take place.

Furthermore, in documentation, the moment of assessment occurs within a profound relationship between the observer and the child. It is a beautiful

“When we use a predetermined assessment form, we do an injustice not only to the child, whose creative expression we determine for them, but also to the observer, whose opportunity for deep listening and growth is annihilated.”

moment where the uniqueness of the child and the uniqueness of the observer meet. The child has 100 languages within which she might express her creativity, and the observer must wait attentively to see which language will be revealed. The observer has a beautiful uniqueness as well, and in this moment of observation she has the opportunity to be changed by what she sees and interprets from the child's way of expression. Documentation is not only interpretable, it is also an interpretation. It is a narrative form, an intra- and inter-personal communication, because it offers to those who document and to those who read it a reflective and cognitive opportunity. In this way, when we use a predetermined assessment form (the traditional approach to assessing creativity), we

do an injustice not only to the child, whose creative expression we determine for them, but also to the observer, whose opportunity for deep listening and growth is annihilated.

Two key words at Reggio Emilia are: *Reciprocity* and *Interdependence*. The observer and the child experience an interaction

that must be reciprocal and interdependent. It is unjust to do otherwise, and does not respect the profound uniqueness of the beautiful humans involved. The process of documentation is fundamentally democratic: You cannot truly educate others without the process also educating you; you cannot observe a child without being changed. If teachers actually know how to observe, document, and interpret the processes carried out autonomously by children, they will realize in this context their highest opportunity to learn to teach. Documentation allows the reciprocal discovery in this moment to flourish.

Conclusion

The assessment of creativity cannot be implemented through traditional means. The appropriate method for this singular process must focus on narration, and not on an objective experiment as usually conceived. To control this process in order to measure it is an act of power and aggression, where the observer takes the power from the child and steals his right to expression. Heinz von Foerster (1984) saw this as an

ethical matter, where there is an "ethical imperative" to act in such a way as to increase the possibility of choice for others, as a space of creativity and freedom – and as Gianni Rodari (1973) said, this is important "not because everyone should be an artist but because no one should be a slave."

We have an obligation, then, to respect the child by evaluating creativity through the act of documentation. We do this not because children are the citizens and innovators of the future, but because they are indispensable citizens of today, since birth. They are the bearer of rights, not only for themselves but for the societies where they live and develop. They are competent in learning, loving, and living, since the moment they entered the world, and they have the power to transform us and open our eyes to the possibilities we have forgotten. We do this because they are the best expression of humanity.

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Footnotes

¹ For further reading on this, see Rinaldi, C. (2006). *In dialogue with Reggio Emilia. Listening, researching and learning*. New York: Routledge.

"We have an obligation, then, to respect the child by evaluating creativity through the act of documentation."



Laura and the Watch: An example of Documentation

Laura is 10 months old. Normally she is defined by what she cannot do: She cannot walk, talk, or read. But in this documented series of moments, we see her asking, with her focused face and her curious hands, "What is the meaning of this?" She is in a relationship with the teacher beside her, and we see in her a desire to create a relationship with this object, to start the process of learning and constructing new knowledge. Will the teacher see her question and desire? Will she support Laura through a creative learning process?

Laura and the Watch is a photo series from Loris Malaguzzi et al. *The Hundred Languages of Children*, exhibition catalogue, Reggio Children, Reggio Emilia, 1996 – ©, Preschools and Infant-toddler Centers – Istituzione of the Municipality of Reggio Emilia



1) Laura cannot speak but she can communicate, using many languages. We can see the question in her face. She is able to ask with her eyes, with her body, with her finger. In this moment, the teacher holds in her hands one of the most profound questions that any human being can encounter: how to respond to a child's question. Does she give an answer, to transmit what she knows? Does she open up an exploration into the baby's question, "What is the meaning of this?" This is a powerful political moment: the teacher represents all teachers, and the baby represents all learners. What will the teacher choose? Her response means everything: she can support and cultivate the competencies of exploration and curiosity of the child, allowing her the beautiful opportunity to make mistakes and be creative with the materials; or she could simply ask the child to repeat what the teacher already knows.

2) The teacher chooses to develop a creative context. She doesn't give an answer to Laura's question, but instead she expands upon it. She offers a way to create a connection to other languages. She shows her own watch. This reveals the many possibilities for exploring this question, "What is this?" Laura is focused and is able to understand the connection.



3) Laura explores the physical watch, and shifts to another language: listening. Instead of giving an answer, the teacher created a possibility for the child to give her own answer. This moment represents the drama of learning, and how difficult it is to understand.

4) Laura makes a connection between the physical watch and the photo of the watch. She tries to use the listening language to explore the picture. Is this a mistake? A creative gesture? The teacher allows her to cultivate her own strategy for research, for finding the meaning of things and the meaning of life.



Assessment that supports classroom creativity

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Introduction

When we think about classroom assessment, we often think about how best to determine whether students have met criteria in expected ways. Assessing classroom creativity is different, because we want to determine whether students can meet expected criteria in *unexpected* ways. Doing so does not require a radical transformation in approach; typical assessments can be modified in minor (or major) ways to make space for creative expression. Assessments that are not just *of* creativity, but for creativity not only *evaluate* creativity but also help *cultivate* it.

Why we need to assess creativity differently in the classroom

Classroom assessment is typically used by teachers to document whether and how students have attained academic learning goals, by assessing students' performance on learning activities that have clearly defined success criteria. More specifically, *what* students are expected to do and *how* they are expected to demonstrate their learning are known in advance by teachers and students. Asking students to solve 10 algebraic problems using a previously taught method (e.g. elimination) is an example. Teachers would simply assess whether students can arrive at the expected answers using the expected approach (i.e. 'showing their work').

Even in subject areas with multiple ways of approaching a task (e.g. writing fiction, historical analysis), teachers develop and use scoring rubrics and checklists that specify, in advance, what it is they are expecting to see demonstrated in students' work. Success is thus determined by whether

students can match their performance to *what is expected* and *how it is expected*.

Assessing creativity is different. Academic learning outcomes are often known in advance, while creative learning outcomes are emergent. This is because creativity always involves some level of uncertainty and therefore some element of surprise (Simonton, 2017). This is not to say that creativity is completely unconstrained. Indeed, *classroom creativity* has been defined as a blend between originality and meaningfully meeting task criteria (Beghetto, 2019; Runco & Jaeger, 2012). Thus creative learning

"Assessments that are not just of creativity, but for creativity not only evaluate creativity but also help cultivate it."

outcomes can still have some predetermined criteria that need to be met, but how students meet them is to be determined (abbreviated as TBD). Put simply, creativity can be thought of as using unusual or different ways to meet curricular goals.

There are numerous creative paths students (and teachers) can take to meeting pre-established criteria (see Figure 1). These paths can even start on a previously taught or expected path and then diverge, thereby meeting the criteria creatively. Conversely, a path that diverges from what is expected, but does not meet the criteria, is simply different or original

and not creative. Creativity represents a 'both/and' combination of meeting the criteria, but in new, different and often unexpected ways (Beghetto, 2019a).

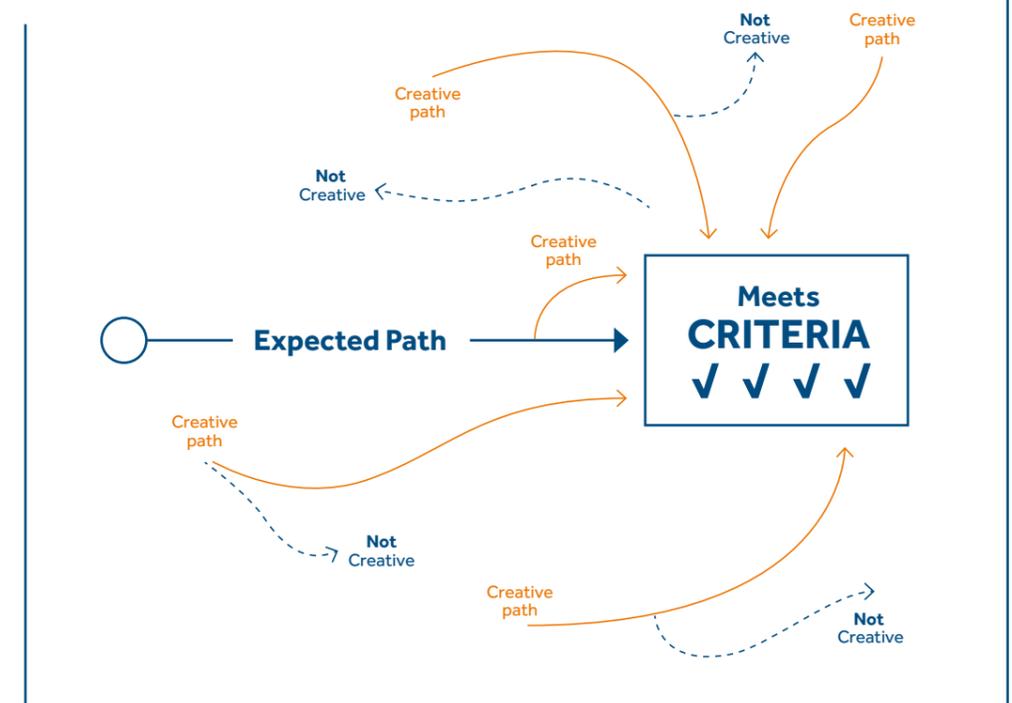
When students are invited to meet criteria in new and different ways, they are provided with an opportunity to demonstrate and develop their creativity. Opening up the possibilities for how students meet criteria requires transforming the typically predetermined pathways into TBD pathways, thus introducing uncertainty. This uncertainty is both necessary for and supportive of creative expression. In other words, if students and teachers already know how to get from A to Z, the pathway would not be creative.

Students are not simply set adrift in chaotic uncertainty; they are supported in producing new and different ways of meeting learning goals and

criteria. A math teacher, for example, could introduce a particular type of problem (a predetermined *what*) and then demonstrate a common method for solving it (predetermined *how*). They could then invite students to accurately solve similar problems (predetermined *what*) in as many different ways as they can (TBD *how*), or to create their own problems to solve (TBD *what*) using both the taught method (predetermined *how*) and their own methods (TBD *how*).

When teachers transform predetermined aspects of the curriculum into elements that are to be determined by students, they are providing structured opportunities for students to resolve uncertainty creatively (Beghetto, 2018). This opens up the curriculum for students to demonstrate their understanding in new and different ways. How might teachers assess this form of creative learning in classrooms?

Figure 1. Classroom creativity





How to assess classroom creativity

There are two key questions to consider when attempting to assess classroom creativity:

1. Did the student demonstrate novel, different or unique thoughts and actions when engaging with the assessed task?
2. Did the student demonstrate successful attainment of the learning goal or criteria?

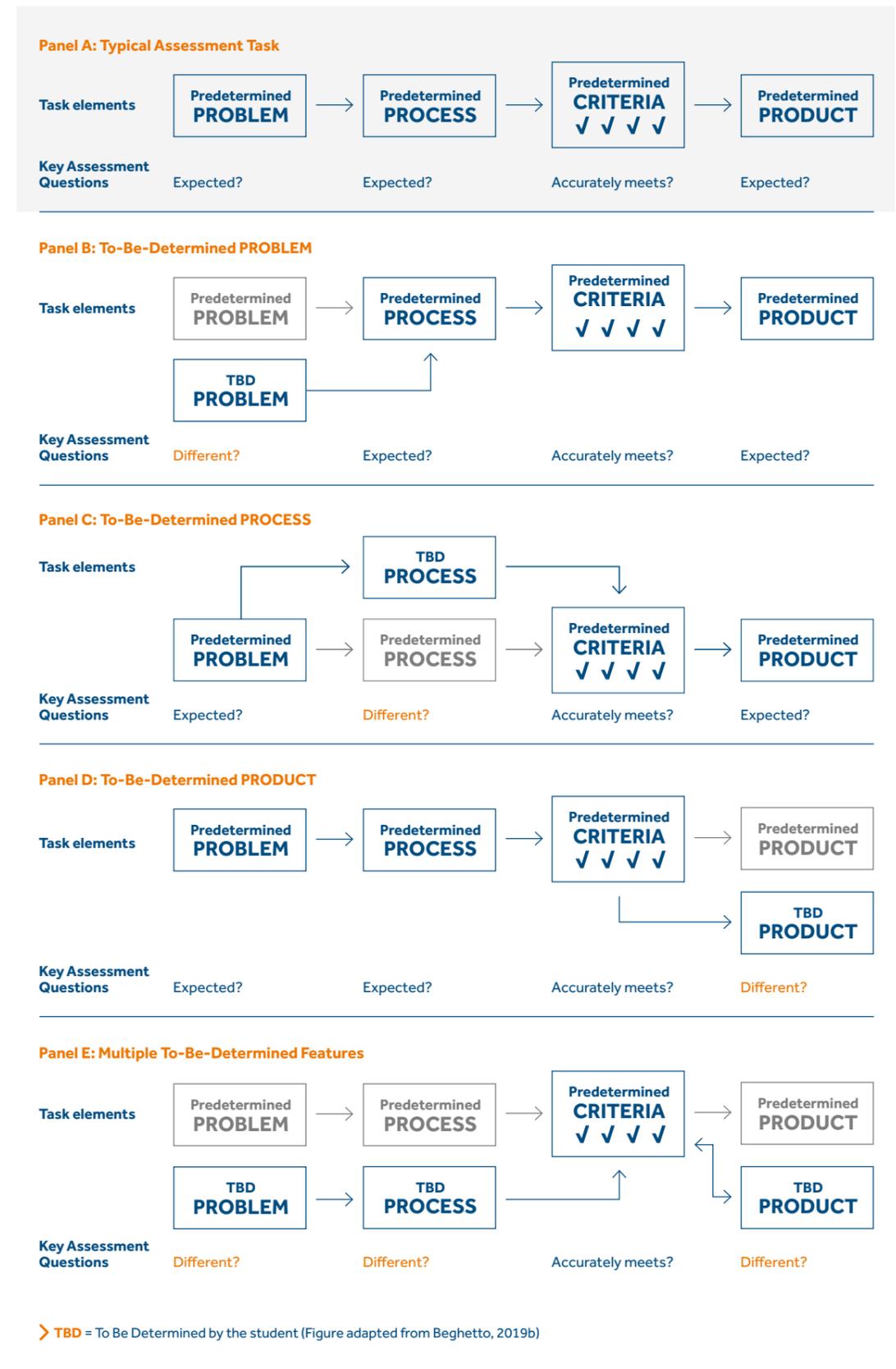
Educators may also find it helpful to clarify the different components of the task they will be assessing. Learning tasks have four interrelated components (Beghetto, 2018, pp. 7–8):

- **Problem:** the question, issue or task students are asked to address, i.e. 'what' students are asked to do
- **Process:** the approach, method or procedure students will use to solve the problem or complete the task, i.e. 'how' students address the problem
- **Product:** the solution, outcome or demonstration of solving the problem, i.e. 'how' students demonstrate they have met the criteria
- **Criteria:** the guidelines, rules and standards for evaluating success, i.e. non-negotiable benchmarks that are known in advance by teachers and students.

In the typical approach to assessment, teachers design and use learning tasks wherein all the above elements are already defined, and assess whether students' work has met the known criteria by addressing the presented problem, using the expected process. There are numerous ways in which teachers can modify or design learning tasks to provide opportunities for creative expression, by replacing one or more predetermined elements with a TBD element, for example where students produce their own problems, processes and products (see Figure 2).

A language arts teacher, for instance, might assess whether students are able to meet *predetermined* criteria by engaging in an *expected* task (e.g. demonstrate understanding of two literary devices),

Figure 2. Transforming existing assessment tasks into creative learning tasks





but do so in a *different* way (e.g. visual images rather than verbal or narrative) and in a *different* genre (e.g. film, illustration, live action) than what was previously taught (i.e. short stories). Once the type of assessment task and the key elements to assess have been decided, points or a grade can be assigned based on whether students have met the criteria. A simple assessment checklist can be used to score the assignment (see Table 1).

Checklists can help teachers monitor performance, and communicate to students what elements have been successfully completed and how they earned credit for each element. They also provide opportunities for teachers to give element-by-element feedback and encouragement to students.

Teachers can, of course, use this type of checklist as an ungraded form of feedback by removing all references to points, or use it to communicate a more detailed trajectory of student performance by using gradations

of points or levels of performance (e.g. 0 = no attempt, 1 = partial attempt; 2 = satisfies criteria; 3 = exceeds expectations, etc.). Students can themselves use a checklist to self-assess work in progress and finished products, including using it to communicate their questions and comments to teachers (e.g. 'I really tried to do something different here, but I'm not sure if it meets the criteria.'). Assessment checklists can be modified to suit age or developmental-stage groups (e.g. using emoticons instead of points for younger students, giving detailed feedback for older students), or to suit the needs of individuals (e.g. reminding students who tend to focus on originality to be sure to connect their work to the established criteria).

Additional considerations

When teachers assess *for* creativity, there are some additional considerations that can help ensure their assessment practices support, rather than inadvertently suppress, students' creative learning and development.

Required elements	Completed	Points earned	Additional notes & Comments
Use of at least two literary devices (2pts)			
Unique use of techniques (1pt)			
Genre or medium other than short story (1pt)			
Presented to peers in no more than five minutes			
(Additional criteria)			
TOTAL POINTS EARNED			

Table 1. Literary device grading checklist

Assessment for creativity versus assessment of creativity

How we assess creativity matters. If students feel that their performance is constantly monitored and compared, they may be less likely to demonstrate creative responses (Hennessey, 2016), and consequently be less willing to take the risks necessary for creative expression. Conversely, if students understand that the assessment information provided is meant to help them *develop* their creative competence and attain their learning goals, assessment can support creative learning.

It is therefore important that we assess for creativity by providing improvement-oriented information to students (e.g. 'Here's what you did well, and here are a few areas you can continue to improve.'). and not rely exclusively on comparative assessments of creativity (e.g. 'You are more/less creative than other students in this class.'). (See **Barbot & Lubart**, this collection). Although researchers may use assessment of creativity to identify factors that help explain different levels of creative performance, educators, whose goal is to help individual students build on their current creative strengths and address weaknesses, will likely find assessments for creativity more useful (this collection; **Beghetto**, 2019a; Lipnevich & Smith, 2018).

Student-involved, on-the-fly assessment

Given that creative learning outcomes are emergent and tend to involve some element of surprise, it is important that students are also involved in documenting examples of their own creative expression as it happens (see also **Rinaldi**, this collection). Teachers can support this by encouraging students to gather digital and physical examples of their in-progress work, which they and their teachers can later review, curate and exhibit. This helps to share the assessment load and ensure that everyone is involved in documenting novel and meaningful examples, insights and ideas that might otherwise be lost (Beghetto, 2019). This can also help to understand how students' unique perspectives and understandings emerge during everyday learning activities, as well as identify areas in need of further clarification and more direct instructional attention.

It is also important to involve students in monitoring and reflecting on their self-beliefs, which play a

central role in creative performance and creative identity development (Beghetto & Karwowski, 2017; Karwowski & Kaufman, 2017). Although researchers have developed a variety of ways to assess creative self-beliefs, teachers can simply invite students to monitor and reflect on their confidence before engaging with creative learning tasks (e.g. 'Before starting this assignment, take a moment to [describe, discuss or rate on a scale of 0–100] how confident you are that you can come up with two different examples.'). and again following completion of the tasks (e.g. 'Take a moment to review the level of confidence you [described, discussed, rated] prior to the task. Were you accurate? Explain. What, if anything, surprised you about this assignment? How confident would you be if you had to complete a similar task?'). This can help students better calibrate their beliefs in the light of actual performance (e.g. recognizing that they often lack confidence when approaching certain tasks, or sometimes overestimate their ability to perform creatively on particularly challenging tasks). They may as a result of this self-reflection be more willing to take creative risks and seek assistance when needed (Kaufman & Beghetto, 2013).

When students are engaged in the assessment process, including self-monitoring their creative confidence, they are more likely to see how assessment information can support their learning (i.e. assessment *for* creativity), rather than viewing assessment information as something that teachers only use to make comparisons and calculate grades (i.e. assessment *of* creativity).

Concluding thoughts

Not only is it possible for teachers to assess creativity in the classroom, it is possible for them to do so in ways that support the development of creativity itself. When assessment approaches provide opportunities for students to meet curricular goals using unexpected approaches, and when they involve students themselves in the assessment process, they can help ensure that their assessment practices are supportive, rather than suppressive, of creative expression.

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SECTION 3

How can children's perspectives of creativity inform assessments?



Children's creativity with coding and the problematic appeal of automated assessment

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Introduction

Over the past decade, an educational movement has been growing internationally for all children to learn to code. When people think of coding a computer program, they often think of it as a narrow technical activity that is fundamentally different from painting a picture, writing a story or playing with building bricks. Yet, for many children, computer coding is a *creative* activity in which they are using a set of materials to develop and express their ideas.

As coding has been adopted by school systems, interest has grown in assessing what students learn as they code. Most assessment efforts focus on specific technical skills and concepts – and thus ignore the broader creative thinking and communication skills that children can develop in the process of coding their own interactive projects. To understand the gap between

what is measured in current assessments of children's coding and the full range of what children are learning as they create with code, it helps to look at young people's creations and their reflections on their own creative and learning processes.

“For many children, computer coding is a creative activity in which they are using a set of materials to develop and express their ideas.”

Coding as a creative activity

The most popular way for children to create with code is using a program called *Scratch* (Resnick et al., 2009). Each year, millions of young people (mostly ages 8-16) around the world use Scratch to create and share art, animations, games, stories and other projects. Scratch is available for free and has been translated into more than 50 languages.

To make a project in Scratch, children choose or draw their own images, add sounds and then snap together colourful coding blocks to animate their projects and make them interactive. For example, Figure 1 shows an interactive project created in Scratch by an 11-year-old girl. This project features an animated wolf that can howl at the moon, drink water, walk or sleep, depending upon which keys are pressed on the keyboard.

Unlike many computer programming languages, in Scratch there are no error messages. Instead, children learn to code with Scratch programming blocks similar to the way they build with LEGO bricks: by experimenting, exploring which blocks fit together, noticing the effects of their actions, making revisions and learning from examples created by others.

On the Scratch website, young people share a wide range of creative projects and learn from one another.

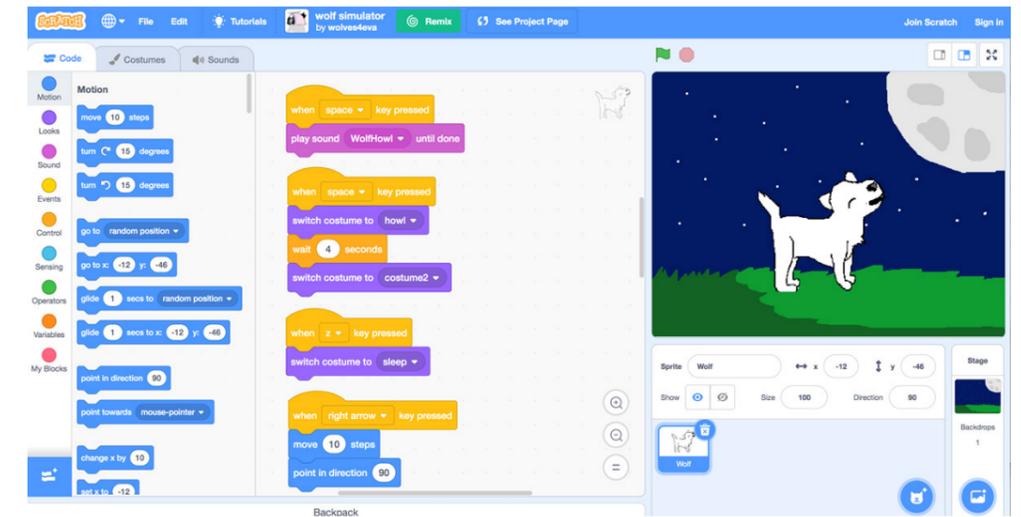


Figure 1. Example of an interactive project created in Scratch

While some participants focus on improving their artwork, others become engaged in drawing and programming animations to bring stories to life, from fictional tales to historical events. Many young people design and program interactive games for others to play. Some make tutorials to share their skills, and some make simulations to model systems in the physical world. Young people are not only creative in what they create, but also in how they collaborate, organizing group projects where each person takes a role and contributes. Some find ways to spark and support others' creativity, such as by proposing creative challenges or designing new tools that others can use.

When asked why they use Scratch, children often refer to the opportunity to create projects based on their ideas, interests or imagination. As one child described: "Scratch helps me to be creative, funny, and just being myself!" Another wrote: "You can do anything! Like write stories. And teach people stuff! Or even make things dance! Scratch is SO fun!" Another young person explained: "I can make a cat fly, a sandwich talk, a man go to space without a rocket! I can make anything I want."

Why learn to code?

Many schools across the globe are introducing coding into the curriculum, beginning in the earliest grades through high school. Sometimes coding is introduced with the goal to prepare students for

jobs in computer science, but increasingly, educators and policy makers are recognizing that the value of learning to code goes beyond preparing for specific technical careers (Santo, Vogel & Ching, 2019).

Many initiatives now position coding as a way to help students develop *computational thinking* skills. While definitions of computational thinking vary, they usually refer to solving problems by applying approaches from computer science, such as breaking problems into smaller parts, defining procedures to accomplish tasks and debugging processes to make improvements. These strategies are seen as applicable to problem-solving across diverse fields, from mathematics and sciences, to social sciences and humanities (Wing, 2008).

While learning problem-solving strategies is valuable, some educational organizations are also recognizing broader reasons for learning to code. The *K-12 Computer Science Framework* (2016) – adopted by many states in the U.S. and other regions of the world – emphasizes broader 21st century learning skills. It states that coding should not just be about learning computational concepts (such as algorithms and variables) but also a wider range of computational practices, including young people learning to create projects that they find personally meaningful or helpful to others in their community. In other words, learning to code involves not only

learning problem solving, but also expanding one's ability to design and program something new and meaningful for the learner.

The rapid embrace of automatic assessment

As coding with Scratch has expanded to schools around the world, there has been a growing interest in assessing what students are learning as they create Scratch projects. Several years ago, a group of researchers from Spain released a free web-based tool called *Dr. Scratch* to assess Scratch projects (Moreno-León & Robles, 2015). *Dr. Scratch* automatically analyzes the coding blocks in a project and gives students a computational thinking score. The *Dr. Scratch* website claims that it helps students improve their computational thinking skills. Yet this tool only analyzes which computational concepts are included in the project, without examining another key aspect of computational thinking: the problem-solving strategies that students are using. It also has no way of evaluating creative expression, such as the ideas conveyed in the text, images and sounds.

Even when analyzing the blocks, *Dr. Scratch* has built-in assumptions that are questionable. For example, it assumes that the more types of blocks included in a project the better, instead of recognizing that different types of projects require different coding

concepts. This automated approach to rating projects is like grading students in a writing class by counting how many grammatical structures they use, without paying attention to the ideas they express or how well they communicate their ideas. Thus, the rating system gives a sense of the *complexity* of the code, but not necessarily the *quality* of the project.

In one of their first published papers on *Dr. Scratch*, its creators acknowledged some of its limitations and stated, "Important aspects of educational environments, such as originality or creativity, are not evaluated, so teachers should not rely exclusively on the score assigned by *Dr. Scratch*" (Moreno-León & Robles, 2015, p. 6).

Despite its limitations, the *Dr. Scratch* assessment tool has been rapidly and widely embraced to evaluate students' use of Scratch. I have been surprised how many researchers use *Dr. Scratch* as a measurement tool without mentioning – or perhaps even realizing – how limited a view it gives of what and how children are creating and learning. The widespread adoption of *Dr. Scratch* reflects an understandable demand for quantitative and easy-to-use measures of students' computational thinking skills, but too often the fundamental limitations and problems with this approach to assessment are unacknowledged or overlooked. To understand why I find this broad-

"The widespread adoption of *Dr. Scratch* reflects an understandable demand for quantitative and easy-to-use measures of students' computational thinking skills, but too often the fundamental limitations and problems with this approach to assessment are unacknowledged or overlooked."

scale adoption of automatic assessment of children's creations problematic, I think it helps to hear how young people talk about their Scratch projects and creative process.

What can we learn from looking at young people's projects?

Kappyz is the username of a young person who has created a variety of projects with Scratch.¹ During her first 18 months in the Scratch online community, she shared 60 projects, including art, games and other creations. If you were to look only at the coding blocks in her projects, you might think she was not making much progress. Many of her projects receive a relatively low score on *Dr. Scratch*, which rates projects on a scale from 0 to 21 points (Figure 2). Yet this score does not tell the full story of what Kappyz was creating and the skills she was developing. Because *Dr. Scratch* only evaluates coding blocks, it almost entirely neglects three critical features of projects: the *content*, the *context* and the *child* (Guernsey, 2012). The fundamental mismatch between this assessment tool and the projects it was designed to evaluate becomes clearer by looking at Kappyz's projects, such as the three examples described below.

(1) Frozen: One of Kappyz's projects only uses two coding blocks (Figure 3). In this project, she recorded a song from the movie *Frozen*, which she played

on her flute. When she shared her project on the Scratch website, Kappyz wrote notes to explain the project to others in the online community:

I messed up a few times, but I hope you enjoy it anyway :) Me and my friend are performing this in our school talent show, but I figured, since I've been practicing 24/7 anyways, that you all deserved to hear it too!!!

As her description reveals, her focus is on sharing her musical practice and performance. She is engaging in self-reflection and is using Scratch to share her process with others.

This project receives an automated score from *Dr. Scratch* of only 2 points because it only uses two coding blocks. Yet Kappyz was effectively using the Scratch coding platform to share a personally meaningful project. The *Dr. Scratch* assessment is totally unaware of the *content* of the sound recording, which Kappyz recorded to share with others. *Dr. Scratch* is also unable to evaluate the communication and reflection process that she engaged in when sharing her project in the online community.

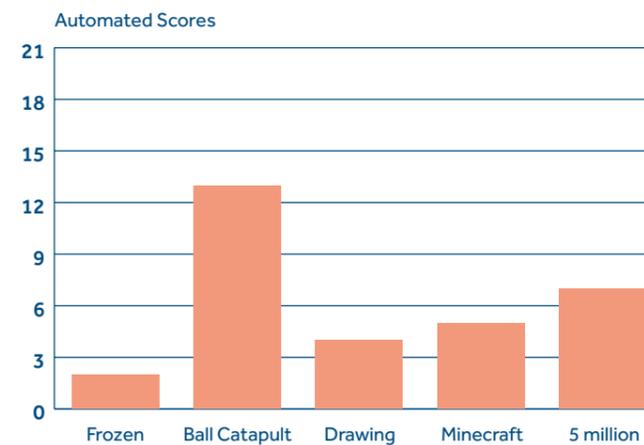


Figure 2. Automated scores of five of Kappyz's shared projects, based on an analysis by *Dr. Scratch*

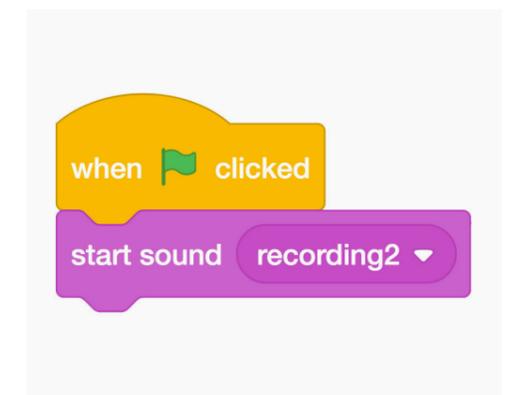


Figure 3. Two-block script for playing the sound recording of Kappyz's musical performance

(2) Ball catapult: Kappyz's next shared project was called *Ball catapult engine!!!* (Figure 4). Her instructions explain how to press keys to launch the blue ball. In her notes, Kappyz described her process for making it:

I programmed this 100% by myself, but I did look at some other engines (for the scrolling as I didn't know how to) so I will credit that for helping me :)

She gave credit and linked to two other Scratch projects that she said were "super helpful". She added parenthetically: "This may just be the hardest thing I have ever programmed."

In this project, Kappyz used 80 coding blocks, including variables that track the ball's x and y velocity. Based on the complexity of the code, Dr. Scratch gives this project a score of 13 out of 21. The score might suggest that she had done something wrong, when in fact there are no right answers nor one right way to code a project. Adding other types of blocks may have increased the score, but would not necessarily have made the project work better.

The automated assessment did not recognize a fundamental aspect of this project: the personal

development of the *child*. It was incapable of recognizing that Kappyz was exploring ideas new to her in mathematics and physics, nor that she was willing to stretch beyond what she knew to take on a significant challenge: the hardest thing she had ever programmed. The score also does not reflect how resourceful Kappyz was: she learned from other projects she found in the online community, and then made sure to give credit – all valuable skills to support communication, collaboration and creative learning, which are not reflected in the code.

(3) Scratch Facts (5 million projects): Another project that Kappyz created was to celebrate a milestone occasion in the Scratch online community: when the total number of projects shared reached 5 million. She programmed a slideshow, accompanied by music, that highlights a variety of numerical facts about Scratch (e.g. how many languages it is available in). She also calculated how many projects she personally had contributed to the overall total of 5 million, stating: "My projects make up 0.0025% of that." The final slides of her project encouraged everyone in the community to create more projects: "If we all created a project right now, we would have over 2 million more projects. So go make some projects!"

Kappyz received a variety of comments from other community members who liked the project. In one comment, a young person compared how long it took him and his friend to make projects. Kappyz replied by reflecting on quality versus quantity, commented that high-quality projects can take a long time and posted a further calculation of days spent per project.

Her project uses 12 coding blocks, which play the slides and background music (Figure 5). The code is brief but efficient and works well, yet the project receives a score of only 7 out of 21. Dr. Scratch is unable to interpret the meaning of the project within *context*. Kappyz was using coding to contribute a valuable perspective to a dialogue about a current event in the community. She analyzed her data in the context of a larger community, and encouraged others to be active and creative.

As part of its rating, Dr. Scratch gives this project 0 for logic (Figure 6). This low score is because the code does not include any conditional blocks (such as "if-then" statements). However, looking at the content of her project, it is clear that Kappyz was applying conditional logic within the project text: ("If everyone made a project, we would have over 2 million more projects").

Rethinking assessment

In just these three projects, we can see some of the diverse and creative ways that Kappyz was using Scratch. To understand the skills she is developing, we need to look beyond the coding blocks. She was becoming fluent in expressing her ideas across multiple areas and developing a broad range of skills in the process.

Of course, all measures have limitations (see **Cramond**, this collection). Some researchers may argue that although the analysis that Dr. Scratch offers is limited, at least it provides one way of looking at the computational concepts that young people use. However, I see several reasons for caution about applying assessment tools that ignore the process, meaning, context and development of children's creations, yet claim to assess their thinking skills and what they are learning.

I am concerned that these tools are not just limited, but actually push educators and students to shift their focus away from creative and meaningful expression, and towards a narrow view of which computational constructs are included in a project. I am particularly concerned about assessment tools that provide

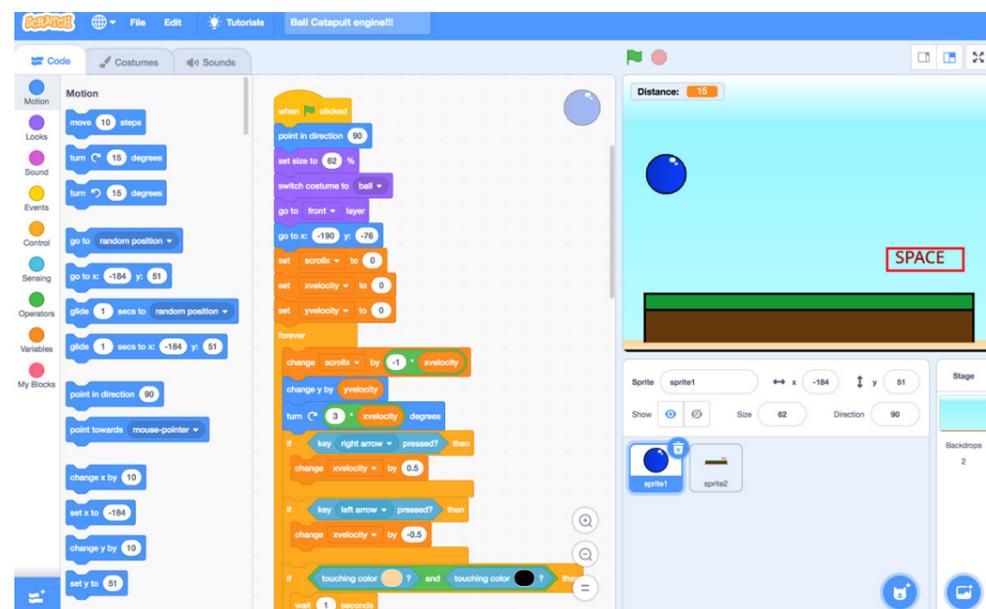


Figure 4. Ball catapult project

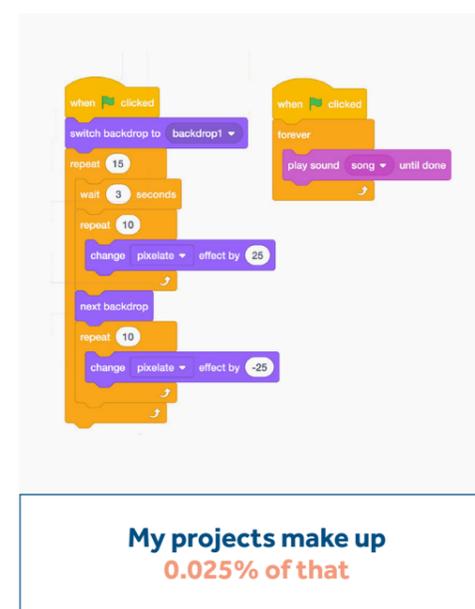


Figure 5. Code and screenshot from the 5 million project

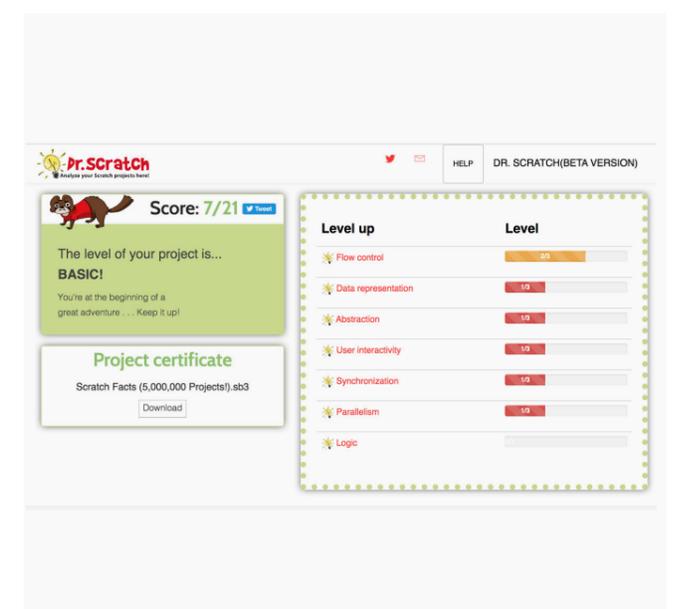


Figure 6. Dr. Scratch rating for Kappyz's 5 million project

feedback to students without carefully considering how the assessment may affect their view of their own work and their motivation for exploring and creating more.

I can imagine that with further research and developments, automated assessment tools could take more of the content and context into account, such as using text analysis to analyze students' project notes. Yet I am not sure that would get to the heart of the matter.

A recent research paper has the title, "Is my game OK, Dr. Scratch?" (Troiano et al., 2019). Although playfully expressed, this title highlights how Dr. Scratch places students in the role of seeking approval from the assessment tool. In his book *Mindstorms* (1980), Seymour Papert warned against placing computers in the role of instructing children. He advocated that rather than the computer programming the

child, the child should be empowered to program the computer. By asking computers to decide the value of a project, it shifts the agency away from students and towards the automated tool in deciding what is valued. It directs students'

attention to the score, rather than noticing how their project is working and thinking about their own vision. It also misses the important role that peers play in providing feedback and offering suggestions in the community, which often motivate young creators to make improvements and learn more (Roque & Rusk, 2019).

Many people are seeking tools to evaluate children's creative thinking and computational thinking. But what if automated assessments cannot evaluate what matters most to children in their contexts? The rapid adoption of an assessment tool like Dr. Scratch—without careful consideration of its assumptions and limitations—is worrisome. Before offering any tools to children, we should make sure that they encourage rather than discourage creativity and collaboration (Dhariwal, 2018). We need to provide more opportunities and support for children with diverse backgrounds to explore, experiment and express themselves, so that they are able to develop creative

approaches to address the complex challenges of our rapidly changing world.

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“What if automated assessments cannot evaluate what matters most to children?”



PLAY AND CREATIVITY:

The implications of children's perspectives for definition, measurement and testing

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Introduction

In recent years, significant advances in measuring the benefits of play have been made by considering what children themselves consider playful. Research has demonstrated that children can define the same activity as play and not-play, according to environmental and emotional cues – for example where and with whom an activity takes place, and whether or not they feel they have a sense of choice and control. Children approaching a task in playful rather than non-playful ways show superior learning skills across domains during that task. Playfulness as a state of being – a mindset or way of approaching a task – is at the core of its developmental potential.

In light of the OECD's plans to introduce assessment of children's creative thinking in the 2021 PISA, this essay considers the potential value of understanding children's own views of creativity and the implications of regarding creativity as a measurable construct.

Consistent with the LEGO Foundation's (2019) definition of creativity being rooted in children's self-determined, autonomous and self-regulated behaviour, this piece is concerned with the implications of understanding creativity from the perspective of the creator, seeking to highlight how literature surrounding the measurement of creativity can be usefully informed by research that has studied play from the perspective of the player.

Children's perspectives of play differ from adults'

It is widely accepted that play makes important contributions to children's development, although rigorous evidence has been lacking (Whitebread, 2012; Whitebread et al., 2017). One reason for this is that there has never been a clear consensus among scholars as to what play actually is, and without this it becomes almost impossible to measure (Lillard et al., 2013). Adult definitions of play have traditionally focused on it being a particular type of activity (e.g. Piaget, 1956; Hughes, 2002) or being determined by certain defining characteristics (e.g. Rubin, Fein & Vandenberg, 1983; Eberle, 2014). A common factor is that these are based on an adult frame of reference, rather than the views of children.

Research that has focused on children's perspectives of play has revealed three key findings. First, children's differentiation between play and other activities appears to develop over time. Consistent with the common view that infants do not distinguish between play and work, when asked to organize photographs of various activities, younger children see more of the activities presented in the photographs as being like play than older children do, and their reasons for differentiating play from other activities become more elaborate over time (Howard, 2002; Howard, Jenvey & Hill, 2006; Howard, Miles & Parker, 2008).

Second, the cues children use to determine whether an activity is or is not play are based on children's previous social and environmental interactions. For example, if children in early years classrooms are unused to adults engaging with them during play, then activities where an adult is present are categorized as not-play by those children. Similarly, if children experience mainly formal, teacher-directed tasks at a table, the table becomes a cue to activities being not-play (Howard, 2002; Howard & Westcott, 2007). Children are also sensitive to

whether or not they believe they have any choice over their participation in an activity (Breathnach, Danby & O'Gorman, 2017; Pyle & Alaca, 2018), which can be influenced by teachers' use of open rather than closed questions and the amount of child-initiated

conversation (McInnes, Howard, Miles & Crowley, 2010, 2013). Contrary to some of the most recognized play criteria defined by adults, children themselves do not appear to require that an activity be completely freely chosen to consider it play: they are comfortable with negotiation and compromise so long as they have a sense of autonomy (King & Howard, 2016).

Third, when research is conducted using children's own understanding of play, the evidence is clear: when children sense that an activity is play and so approach it with a playful mindset, it has a significant positive impact across developmental domains. Various studies have presented groups of children with exactly the same task, but with one group undertaking it in ways they see as being like play (e.g. on the floor, without an adult, and having been asked if they'd like to participate) and the other group in ways they see as not-play (e.g. at a table, with an adult present, and having been instructed to participate). On observing aspects of children's behaviour when completing a jigsaw puzzle before and after a practice session, for example, whilst the performance of both groups of children improves,

children who approach the task playfully complete the puzzle more quickly post practice, show superior problem-solving skills and increased signs of positive emotional health, are less frequently distracted, and are more deeply engaged during the task than their counterparts (Howard, Miles & Griffiths, 2004; Thomas, Howard & Miles, 2006; McInnes, Howard, Miles & Crowley, 2009; Howard & McInnes, 2013; Howard, Miles, Rees-Davies & Berkenshaw, 2017). Additional research has looked at the playfulness of naturally-occurring (rather than experimentally-manipulated) tasks using similar cues, and evidence in this context further supports that playfulness can optimize and amplify learning and development (e.g. Whitebread & Coltman, 2010; Ramani, 2012; Sawyer, 2017).

Lieberman (1977) proposed that 'play can be seen as a matrix of behaviour in general, but at the same time [there exists] a quintessence that makes behaviour play or not play' (p. 63). By this, he suggests that there is something unique about play activities that comprises more than what we can observe. Focusing on children's perspectives of play has facilitated significant advances in understanding this 'quintessence', namely the centrality of 'playfulness' as a mindset for approaching a task, which in turn has enabled us to evidence how and why it supports children's development.

Children's perspectives on creativity are missing

Something akin to the quintessence of play, playfulness, may also have an important role in the developmental impact of creativity. Bateson (2014) suggested that there was a distinction between 'play' and 'playful play', with a playful mindset enabling children to behave and think in more spontaneous and flexible ways. His research also revealed that adults who considered themselves to be playful were also more creative, generating increased novel solutions to challenges and producing higher quality outcomes and possibilities. Given the parallels between the concepts of play and creativity, just as a 'play' activity can be approached in a 'more or less playful' manner (i.e. with a playful mindset), it is surely also possible to 'create' in a 'more or less creative' way (i.e. with a creative mindset). In other words, demonstrating creative ability does not necessarily mean life challenges will always be approached with

“Focusing on children's perspectives of play has facilitated significant advances in understanding... namely the centrality of 'playfulness' as a mindset.

a creative mindset, just as activities are not always approached in a playful way by children. Just as with play, maximizing the developmental potential of creativity requires us to understand the cues children use to define it and the conditions that are needed to promote it.

To date, there are few studies that have focused on children's perceptions of creativity. Studies of perceptions in adulthood, however, suggest that there can be significant variations in how creative the same idea is perceived to be, by different people in different contexts at different times. What an individual recognizes to be creative has a significant subjective component, related to individual differences, past experiences, and subsequent memories of creative activities. The more similar a new experience or activity is to something

“Maximizing the developmental potential of creativity requires us to understand the cues children use to define it.”

perceived as creative in the past, the more likely it is that this will also be perceived as creative (Zhou, Wang, Song & Wu, 2016). Like perceptions of play, perceptions of creativity do not develop or manifest in a vacuum, but rather in a particular context by which they are influenced (Harvey & Kou, 2013). Individual inclinations toward creativity are continuously shaped by social & environmental experiences (Barbot, Lubart and Besançon, 2016). In one study of children's views of creativity, for example, autonomy, choice and control were identified as pivotal defining characteristics that are seemingly shaped by adult-child classroom interactions (de Souza Fleith, 2000). These parallels between play and creativity are provocative and suggest that children's own perspectives of creativity may be a critical and missing component in our understanding of how creativity affects children's development.

Implications for assessment and practice

The drive toward measurable outcomes in education is fraught with problems, especially when this measurement involves elusive concepts. Lucas and

Spencer (2018) predict that as creativity has now been deemed worthy of assessment, practitioners will take it more seriously and this will have a positive impact on children's educational experiences. Unfortunately, this does not necessarily follow: curricula policy in the UK highlighting the importance of play for children's learning has not automatically led to children experiencing authentic playful learning environments. Practitioners are often unsure of their role in play and have no clear understanding of what it is; nor are they confident in the evidence underpinning its effectiveness (Howard, 2010; Ivrendi, 2017; Wood, 2014; Skilbeck, 2017). They feel under pressure to 'teach to the test' and so use play as a vehicle for achieving prescribed outcomes, providing contrived rather than authentic play experiences (Pyle & Daniels, 2017). Authentic play, where children feel the autonomy and control necessary for them to benefit from the developmental amplification of playfulness as an approach to a task, frequently remains reserved for times when other, 'more important', teacher-directed tasks have been completed. Further work is needed to ensure a widespread understanding of what we have learned from children about their play, namely that playfulness as a psychological mindset is what sets it apart as the optimum means of learning in childhood (Howard, 2019).

The challenge of generating creative thinkers prepared for the 21st century and beyond is similarly complex and requires more than a one-time test of creative thinking in 15-year-olds in 2021. It requires an evidence-based strategy that is carefully and systematically implemented, beginning in the earliest years and considering the profound culture shift (see Kendall-Taylor, this collection) and intensive educator training required for success (Zosh, Hirsh-Pasek, Golinkoff & Dore, 2017; Zosh et al., 2018). The success of promoting creativity in education will be influenced by teachers' own beliefs about the concept, which, as is outlined by a large scale review of the literature, are diverse, contradictory, context-dependent and frequently espoused but not enacted (Berezcki & Karpati, 2018). Just as in the case of play, it will also be reliant on our listening to children's own perspectives.

Children's voices appear lost in our conversations about what creativity is and how it might be measured. Play and creativity share many common

characteristics and as such, individual perceptions of creativity and creative behaviours are likely to be influenced by a combination of, and the interaction between, personal and contextual factors. Simonton (2016) distinguishes the personal psychological experience of being creative from the validation of our ideas and actions as being creative by others such as teachers, peers, or colleagues. Currently, the predominant focus appears to be on Simonton's validation element, measuring

“Without a full understanding of... what creativity means to children, there is a very real danger that children's creative thinking will be at best partially and at worst inaccurately, measured.”

creative processes or products and, as is argued by Glăveanu (2011), much more needs to be known about creativity from a personal perspective.

Given the parallels between play and creativity, this is particularly so if, as seems likely, the beneficial processes and products of creativity are dependent on our being in a creative state of mind. As yet, we know little about what children think creativity is, and what kinds of things they feel promote or hinder this state of mind. Without

a full understanding of what creativity means to children, there is a very real danger that children's creative thinking will be at best partially, and at worst inaccurately, measured.

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SECTION 4

What do traditional creativity assessments measure, and how?



CREATIVE... COMPARED TO WHAT?

Why the reference group matters in creativity assessments

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UCLouvain

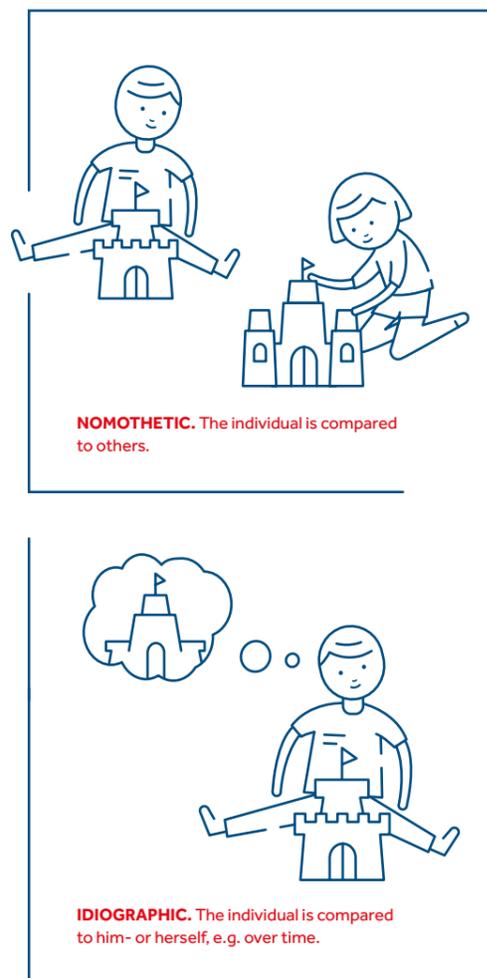
 **Todd Lubart**
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Introduction

Creativity can be defined as the ability to produce work that is both original, and adaptive or meaningful in its context (e.g. Runco & Jaeger, 2012). However, this definition doesn't tell us a critical piece of information we need if we want to measure creativity: for whom is that work original

“There is no ‘absolute norm’ with which to gauge the creativity of a performance.”

or meaningful? There is no ‘absolute norm’ with which to gauge the creativity of a performance (Amabile, 1983), and any assessment of creativity supposes that a given individual's performance on a given creative task is compared with a ‘frame of reference’. This frame of reference is usually one of two things: the average performance of other people (i.e. **the nomothetic approach**, which, for example, asks, ‘Is this child more creative than others?’), or the performance of the same individual compared across different points in time (i.e. **the idiographic approach**, which asks, ‘Is this child more creative now than in the past?’ (Barbot, 2017)). In other words, nomothetic and idiographic approaches measure creativity with respect to different references. Both document distinct aspects of one's potential for creativity, and we argue that a comprehensive approach to creativity assessment must include both.



All creativity measures need a frame of reference

Why is this frame of reference necessary? Without a frame of reference, creativity scores cannot be meaningfully interpreted. Consider the Alternate Uses Task (AUT; Guilford, 1956), a classic measure of divergent thinking, which is an important ingredient of creativity. In AUT, individuals are asked to produce as many different and original uses for a common object as they can. One feature that we can look at in this task is the ‘ideational fluency’ of the test-taker, which is the number of responses produced within a given unit of time. What does it mean for someone to

produce 20 alternate uses for a brick in 10 minutes in this task? The answer to this question depends on the frame of reference: whether nomothetic or idiographic.

Nomothetic frames of reference

In the nomothetic approach, this raw score of 20 would be compared with the performance of others: does this demonstrate high ideational fluency, or is this just about average? Does this performance have the same meaning depending on whether it is obtained by a six-year-old child, or a young adult? This illustrates that raw performance on any test doesn't convey any direct meaning. In the nomothetic approach, it is only by comparing this raw performance with a ‘norm sample’ as a frame of reference that we can fairly interpret this score. If the norm sample has an average of 25 responses and the typical deviation to this performance is +/- 5 responses, we know that the performance of 20 is in the low-average range.

The frame of reference (the norm sample) would probably look different, of course, for an adult versus a child. In other words, the average performance of the norm sample would likely be different according to whether it is composed of children or adults. A follow-up question we must ask when using the nomothetic approach is how specific the frame of reference should be. Usually, it consists of a representative sample of people who share the

same background characteristics of the tested subject. If age and gender are known to influence performance on this test, the performance of a 12-year-old boy would ideally be compared with a representative sample of 12-year-old boys. Thus, a norm sample has varying levels of specificity. It's also possible to get even more specific: think about the 12-year-old's performance in relation to other 12-year-old children within the same classroom, school, district/region, or country – perhaps 20 AUT responses is very high in a given region or country, but average for a given school, and low in the boy's own classroom. Such levels of specificity might be meaningful and important; however, comparing at a very high level of specificity (such as the classroom) is often unrealistic. Most psychological tests, including tests of creative potential, rely on national norm samples, with varying degrees of specificity within those samples (e.g. age and gender). National norm samples are meaningful, in that members of the norm samples share a similar cultural heritage and have benefited from similar educational backgrounds and opportunities.

Idiographic frames of reference

In the idiographic approach, which most commonly refers to the study of intra-individual variability (Molenaar, 2004), the frame of reference becomes the individual him- or herself. We can distinguish three types of intra-individual variability, namely, *inconsistency*, *dispersion* and *change*. *Inconsistency* refers to the variations that exist within an individual's performance. For example, among the 20 uses for a brick proposed by a 12-year-old boy in an AUT task, some responses have a high probability of occurrence (e.g. to use it as a doorstop), and some are very uncommon (e.g. to use it as a rocket ship for a doll). In other words, the pool of responses is rather heterogeneous with respect to the level of originality (or uncommonness) of each response, with some being much more common than others. This heterogeneity is routinely ignored in nomothetic approaches, which tend to summarize the whole performance of an individual using a single score for originality (Barbot, 2018; Reiter-Palmon, Forthmann & Barbot, 2019), which is then compared with the frame of reference. There is reason to believe, however, that inconsistency carries meaningful interpretations and should not be ignored (Barbot, 2018). For example, in some early idiographic

“Without a frame of reference, creativity scores cannot be meaningfully interpreted.”



approaches to the measurement of creative ideation, Binet (1900) explored the mechanisms that people used to transition from one response to the next, offering insights into the individual's creative thinking process (see Barbot & Guignard, 2019).

The second type of intra-individual variability is *dispersion*. It refers to an individual's 'profile' of relative strengths and weaknesses across distinct creativity tasks. Understanding creative potential at the individual level should always refer to dispersion

because creative potential is not a unitary, monolithic or generalized entity. Distinct components of cognition, personality and motivation are involved not only in creativity as a whole, but also are engaged differently in distinct domains. Because the components of creativity and domains of activities are so different, a heterogeneity of profiles is expected. A given

individual has a set of strengths and weaknesses across relevant components of creative potential, and is able to put them into action with different levels of success in different domains. Representing one's potential for creativity as a single performance score does not capture this natural dispersion.

Finally, the third type of intra-individual variability is *change*. This type of variability is most relevant when we try to track the development of creativity, or gauge the effectiveness of a training method, for a given individual. In practice, it consists of evaluating the performance of an individual on the same task over time, using the individual's own past performance as a frame of reference. Despite its apparent simplicity, study of this kind of variability is extremely challenging, notably because it is almost impossible to re-administer the same task to the same individual while maintaining a constant level of novelty in the task (Barbot, 2018, 2019). To address this challenge, some tests of creative potential, such as the Evaluation of Potential Creativity (EPoC; Lubart, Besançon & Barbot, 2011), offer alternate forms that consist of distinct versions of exactly

the same tasks, using different stimuli or problems. Each alternate form can be fairly administered for the same individual on different measurement occasions.

Combining idiographic and nomothetic approaches with EPoC

When we have to choose between the nomothetic and idiographic approaches to assessing creativity, we lose necessarily important information by discarding one or the other frame of reference. When we choose a nomothetic approach, we lose meaningful information about the inconsistency, dispersion and change in each individual's responses. With the idiographic approach, we lose meaningful information about the individual's performance relative to his or her peer group. However, the two approaches can be combined, which we now illustrate using the EPoC assessment (Lubart et al., 2011; Lubart, Barbot & Besançon, 2019).

EPoC consists of a series of domain-specific tasks, covering graphic-visual, verbal-literary, social problem solving, maths, science, music and body movement domains. In each domain, there are *divergent-exploratory* tasks (where individuals are asked to generate many ideas) and *convergent-integrative* tasks (where individuals are asked to generate a single, elaborated idea) designed to be used with children and adolescents. For example, in the verbal-literary domain, a story beginning is provided and the child has to generate many original endings. In another task, a story ending is provided and many story beginnings must be generated. Here, the child's capacity to engage in creativity is measured by *ideational fluency*, i.e. the number of responses proposed, some of which may be of very high originality. If a child generates many responses compared with their peers in the same norm group (nomothetic approach), the child shows a strong verbal-literary divergent capacity. If a child shows very different levels on both tasks, this inconsistency is noted and interpreted within an idiographic approach.

The same logic can be applied across modes of thinking (i.e. convergent-integrative vs. divergent-exploratory) or across domains (e.g., verbal vs. visual). As the child completes both divergent-exploratory and convergent-integrative tasks across

“When we have to choose between the nomothetic and idiographic approaches...we lose necessarily important information.”

several domains, the child's individual profile, with areas of strength and weakness relative to him- or herself (dispersion), may interest educators, parents and guidance counsellors. In which domain does the child show his or her strengths? This and similar idiographic questions can lead to individualized educational approaches and differentiated teaching, based on each child's profile. Finally, within a dynamic testing paradigm (focusing on intra-individual change), a child may be given a first set of tasks, receive suggestions for improvement based on his or her personal profile, and then complete another set of tasks so that progress can be measured (Zbainos & Tziona, 2019). This change in creative performance is itself an interesting issue, and can be addressed by measures, such as the EPoC, that offer alternate forms.

To complete this illustration, consider how the EPoC battery provided both nomothetic and idiographic assessment opportunities in a large-scale 2019 OECD study (Vincent-Lancrin et al., 2019). In this international research, teachers in intervention classrooms sought to promote creativity, whereas teachers in the 'control' classroom used the regular curriculum. All the children, across many schools in each participating country, completed several pre- and post-test measures, including EPoC tasks. In a nomothetic manner, it was possible to compare all the children in control classes with

those in intervention classes, and positive effects of pedagogy were observed. In another nomothetic use, a child who completes the measures can be situated with respect to his or her norm-referenced group, and if the child performed well above the standard range of scores, he or she could be identified as having a high creative potential, a form of giftedness. This clinical use may be relevant in the particular activities proposed to the child. Finally, in an idiographic use, a child's post-test score could be compared with the child's pre-test score using EPoC's alternate forms; this allows a child's personal development of creative ability to be measured, such as the individualized effect of creativity training in terms of percentage gain, using the child's own baseline, without reference to other children.

Conclusion

The only way to really understand a person's creativity is to situate that person's performance compared with the performance of others ('Is this person more or less creative than peers or another more broadly defined comparison group?') and to situate it with respect to him- or herself ('Is this person more creative now than in the past? Is their creativity consistent across tasks and domains?'). Both approaches capture distinct aspects that are necessary for a comprehensive understanding of one's potential for creativity.

"The only way to really understand a person's creativity is to situate that person's performance compared with the performance of others, and to situate it with respect to him- or herself."

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Choosing a creativity assessment that is fit for purpose

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Introduction

How can we measure someone's creativity? It sounds impossible. In truth, we cannot measure creativity, or many other important constructs such as intelligence or other aptitudes. We can only measure a part of them, which we know can be a good indication of the whole. Just as polling companies question a part of the population and use that to predict how the entire population will vote, a creativity, intelligence or aptitude test is just a snapshot, but for now, it is the best we can do.

Thus the discussion of creativity must be framed as one of strengths and limitations within assessment, with the understanding that no single assessment is perfect or can capture the 'quintessence' of creativity as a whole (see [Howard](#), this collection). In other words, we can, with awareness of the limitations and purposes of each assessment, align the foundation of each measure to match the reason for assessment.

This may sound like an intimidating or highly theoretical task, but it's not unlike choosing the best dance shoe for a specific occasion: it is both do-able and practical. What counts as 'the best shoe' depends on the type of dancing you're interested in. If you try to dance ballet in tap shoes, you're likely to fall or, at the very least, make a great deal of clatter in what is intended to be a silent dance form. On the other hand, if you try to tap dance in ballet shoes, you won't be able to make the required tapping sound. We understand in the context of this metaphor, of course, that the conclusion is not that dancing shouldn't involve shoes,

or that ballet and tap shoes are bad tools for dancing; it's that dancing is a wide and complex domain, and that choosing the best shoe is about selecting a tool that is fit for purpose. We need to: a) narrow down the field of dancing to the specific dance type we are interested in, b) choose the shoe that was designed for the specific dance type we have in mind, and c) learn to use the shoe well in the context of that type of dancing. If we do this well enough, we may even be able to find a shoe that not only fits, but also enhances our ability to dance.

"When we match these assessments well to our needs...we can work toward solutions that both fit and even enhance our ability to cultivate creativity."

Returning to creativity, then, we can understand that creativity is not entirely unmeasurable, but is a wide and complex construct, and that choosing the best tool to measure it is about selecting one that is fit for, and even designed for, the specific aspect of creativity we are interested in understanding. As in the dancing metaphor, we must: a) narrow down the field to the specific aspect of creativity we are most interested in, b) choose the assessment tool

that was designed for the aspect of creativity we have in mind and c) learn to use the assessment tool well in context. This essay focuses on the first task by addressing factors that should be considered in choosing a creativity assessment for a particular population and a particular purpose, so that readers can select those that best fit their needs or interests.¹ Each tool has its own value and limitations, but when we match assessments well to our needs, and continue to refine them over time, we can find solutions that both fit and even enhance our ability to cultivate creativity in those whose skill is being measured (see both [Rinaldi](#) and [Beghetto](#), this collection).

Defining what we need

The first step to choosing a fitting creativity measure is to precisely determine the need. For example, those who wish to find creative potential in general populations might want to use instruments that are not biased too much by individual respondents' personal experiences and resources. Those who wish to find young people who will excel in a specialist music school might want to find tools that measure aptitude and ability in music as well as creativity. What, then, are the potential characteristics of creativity we might be looking to measure? What follows is a menu, of sorts, of important characteristics to select from as we carefully decide which creativity assessment is the best fit for our needs.



Where to look for creativity: the 4 Ps

Rhodes (1961) conceptualized the study of creativity into four Ps, dividing the “where” of creativity into the Person, Process, Product, and Press (i.e. the environment or context).

Measures of the creative **person** typically measure the creative personality or life experiences. These are based on the presumption that creative people have some common life experiences or personality characteristics that can predict adult creativity. They also assume, however, that these predictive experiences or characteristics are consistent across cultures, which is not always the case.

Measures of the creative **process** typically measure one of two processes. The first is *divergent thinking*, where individuals respond to tasks by providing many possible ideas; then their responses are evaluated primarily for a) *fluency*, i.e. the number of ideas; b) *flexibility*, i.e. the variety of ideas; c) *originality*, i.e. the rarity of ideas; and d) *elaboration*, i.e. the completeness and detail of the expressed ideas. Or they measure the individual's ability to make *remote associations* between ideas to create unusual combinations. Some of the most widely used, credible and well-researched assessments of creativity (e.g. the Torrance Test and forms of the Random Associates Test) fall into the process category; however, these tests do not measure all aspects of creativity, nor do they claim to.

Measures of the creative **product** typically measure the creativity of the final product or outcome from a creative process, either using specific criteria or the judgment of trained or expert judges. In one sense, this is one of the most logical approaches – creative people produce creative things. However, history is replete with examples of creative products that were not recognized as such during their creators' lifetimes, even by experts.

Measures of the creative **press** typically measure the context within which creativity occurs. These include time and place, as well as the people, culture, physical setting, political climate and resources available for creativity. Although such instruments are not helpful for identifying creative individuals, they may be useful for designing environments that foster creativity.

Age of respondents

Evaluations of creativity must consider differences between children and adults, both in terms of developmental trajectories and differing amounts of experience. For example, when looking for creative children, one must consider that their products are influenced by their (relative lack of) experiences and access to resources. For this reason, it is more accurate to examine children's *creative potential* than the creative products they are actually capable of producing. They must also consider children's developing verbal ability, self-reflective capacity, motor skills, attention span, ability to be influenced and other developmental issues.

Source of information

Is the assessment based on a self-report or based on the report of another? There is always an issue with self-report scales, in that individuals may fake responses to appear more socially desirable (Holden, 2008) if they know what traits are typical of creatives. However, there is a bias when others report on an individual's creativity, too. For example, teachers who do not observe students in situations where they are allowed to be creative are unlikely to see their creative characteristics. Even expert judges can miss examples of creativity when evaluating products, especially if respondents have had unequal opportunities to obtain resources and practice the skills necessary to create the product.

Generality vs. specificity

Some measures attempt to measure creative thinking in a general way, unrelated to a particular domain. This may be seen as analogous to measuring aptitude rather than achievement. Other measures are designed to measure creativity in a specific domain (like art or math) or on a specific product. General creativity may be a more useful measure of young children's creativity, while specific measures would be more useful when attempting to find students with skills and creativity in a certain area, such as science, art, writing, etc.

Holistic vs. criteria

Most assessments of creative products use specific criteria to evaluate the degree of creativity in the product. There is only one assessment (the Consensual Assessment Technique) that uses a holistic evaluation of the creativity of a product.

One reason for the lack of holistic assessments is because they typically depend on the professional judgement of experts. Most awards, such as the Oscars or Palme d'Or, as well as auditions for admission to many specialized schools, depend on the judgement of experts in the field. However, it is difficult to get a team of experts to judge products for school students and get agreement about the quality. In such cases, a list of criteria, such as those used to assess science fair projects, are helpful to ensure some agreement.

In context or decontextualized

Most pencil and paper, or even computer-administered, measures are somewhat decontextualized, in the sense that they ask respondents to think of how they typically behave rather than attempting to measure creativity in the context in which it occurred. Only measures that assess a product that was created in a realistic situation, or observations made within a situation, such as a classroom, are truly contextualized (see [Rinaldi](#), this collection).

Scale, efficiency, cost and culture

Sometimes, we need to evaluate the creativity of a small number of individuals, while at other times, we may need to evaluate on a large scale. In these cases, the efficiency and cost of a measure are important, as is the cultural relevance of each measure. Some instruments are quite expensive and difficult to obtain, while others are readily available at low cost. Some require expert scorers, and others can be machine-scored or scored by anyone with a key. One of the most problematic issues is the question of to what degree the measures are culturally relevant in very different cultures. Some measures have been used in many cultures with comparable results, as long as there are native scorers involved, while others – such as personality measures – are not at all consistent across cultures.



Choosing the appropriate measure

With these characteristics in mind, it is clear that the best measure for evaluating creativity depends entirely on the need. There is no single assessment that meets all needs, but with the strengths and limitations of each approach in mind, we can at least try to align the most appropriate measure with the defined needs.

“It is clear that the best measure for evaluating creativity depends entirely on the need. There is no single assessment that meets all needs.”

✦ The **online appendix** contains a list of many of the most commonly used assessments of creativity, along with the characteristics of creativity they are best suited to measure. It also includes a description of certain limitations associated with each approach. Of course, it is not possible

in a reasonable space to include all instruments, so exemplars of each type are listed.² Furthermore, it is worth noting that these categories are not all mutually exclusive, and some measures can fit into more than one.

Conclusion

In 1950, J. P. Guilford made a speech about creativity to the annual meeting of the American Psychological Association. In that address, he observed that ‘the neglect of this subject by psychologists is appalling’ (p. 445). He challenged his colleagues to study this phenomenon, most immediately the discovery of creative promise in children and the promotion of the development of creative personalities. If we are to understand this important construct and how to support its development in children, we must attempt – however incompletely and imperfectly – to measure it. Since then, this field of study has produced many assessments of creativity, as summarized in this essay and appendix.

Educators and psychologists move forward to assess creativity – as well as intelligence, motivation, personality, and the like – because, even though we know the measurement of such massive, multifaceted and dynamic constructs is imperfect, the value of recognizing and nurturing creativity for the good of the individual and society

is so great that we continue to work towards it (Cramond & Wang, 2012). Rather than give up, we should continue to refine existing measures while developing new and better ones. Such a task requires audacity, but, in the words of the great educator, John Dewey (1938/2008), ‘Every great advance in science has issued from a new audacity of imagination’ (p. 247).

Where are we now? All over the world, people are working on better methods to assess creativity in order to nurture it. Such efforts include adapting and improving existing measures to fit different cultures and times, using modern technology, and focusing on different dimensions of creativity in order to get more precise results. With the international focus on creativity and its link to each nation’s prosperity, I predict that this effort to create and refine creativity assessment will increase and benefit our world.

“If we are to understand this important construct and how to support its development in children, we must attempt – however incompletely and imperfectly – to measure it.”

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Footnotes

¹ The online appendix to this essay supports the second task by providing a comparative list of commonly used assessment tools and the aspects of creativity they are designed to measure. The third task can only come with experience or the assistance of those who have experience in administering each assessment type.

² A more complete listing of tests of creativity, though still not exhaustive, may be found in Runco, 1999.

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