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# Adult play(fulness) and the art of stuff-mess-wonder: Creative playful learning with the Comicubes

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ABSTRACT

This article focuses on the materiality of adult playfulness. The studies synthesized in the article explore creative playful learning at adult age that manifests in association with using simple paper technology in the co-creative context of workshops built on a triad of experiences—stuff-mess-wonder. The article demonstrates how creativity works with a physical tool based on cardboard cubes used for experimentation, ideation and co-construction—the Comicubes. Based on the summarized findings of four workshops, the article concludes how the Comicubes can be an accessible, sustainable and therefore valuable alternative to commercial construction systems and tools alike, by offering a basis for creative play and contributing to experiences related to stuff-mess-wonder.

## Introduction

Playful learning entails "a pedagogical methodology where it is sought that children are active, engaged, socially competent, and can have materials that are fun and meaningful to them". (Hassinger-Das et al., 2017, p. 49). Play has been used to model a signature pedagogy of playful learning in higher education as well (Nørgård, Toft-Nielsen & Whitton, 2017). As a field of research and practice, playful learning allows experimentation, being explorative, open-ended, and urging creative collaboration (Holflod, 2022).

One key aspect of playful learning approaches used with both children and adults is creativity. Humanity advances through creation (Dearybury & Jones, 2020). Creativity refers to the generation or recognition of ideas, alternatives, or possibilities that may be useful in solving problems, communicating with others, and entertaining ourselves and others (Franken, 1998). Following Franken, there are three reasons why people are motivated to be creative: the need for novel, varied, and complex stimulation, the need to communicate ideas and values, and the need to solve problems. In order to be creative, one needs to be able to view things in new

ways or from a different perspective (Franken 1998, pp. 394, 396). This can be achieved by individuals, who carry with them a combination of playfulness and discipline, or responsibility and irresponsibility. As pointed out by Rahbek (2020), the complexity of the nature of creative individuals reminds of conceptualizations made of the orderliness and unruliness of play.

Earlier research advocates the idea of the 21st Century as an era, which demonstrates a move towards a "Creative Society" (Resnick, 2006). The article asks how creativity can be reinforced as part of playful learning of adults and seeks to answer this question by turning to the realm of playful interaction and engagement with physical materials.

While imagination is believed to have an integral role in fueling creativity, creativity does not arise from the imagination alone. Rather, as suggested here, it is triggered by interaction with various physical materials and cultivated through simultaneous use of the imagination in association with interaction and engagement that happens through play.

It is known that play inspires creativity. Psychoanalyst Carl Jung has been said to claim that the creation of something new is not accomplished by the intellect but by the play instinct. Playing, imagining, and creating are considered indispensable activities in the creative process (Lacasa et al., 2015). For example, according to Brown (2009, p. 61), the impulse to create art is a result of the play impulse.

Theobald et al. (2015, p. 346) state that "play is commonsensically recognized as an activity that extends over the lifespan, from early childhood to adulthood, and across cultures". For this reason, playful learning is a matter of importance for adults as well. In particular, the realm of play has been consulted more in past years when considering bringing more playfulness to higher education (see e.g., Nørgård, Toft-Nielsen & Whitton, 2017).

Play has a clear connection to exploration, which inevitably overlaps creativity (Gudiksen & Skjovberg, 2020, p. 186). Kline (2003) notes the active and self-producing nature of play, seeing however that different forms of play permit varying degrees of creativity and experimentation.

Being creative is generally perceived as aspirational to many, but being able to explore through play comes naturally to the most of us. Playing, in essence, associates more closely with experimentation with no preset goals like what might be expected from creative endeavors. Still, creativity and play are both supported by curiosity and being open-minded and imaginative about what comes next.

According to Back et al. (2017) exploratory play is predominantly curiosity driven. However, exploration facilitated with adult learners is usually not conceptualized as activities related to play, but often understood, articulated and defined as the use of art-based methods (McNiff, 2008), project-based learning (De Graaff &

Kolmos, 2007), action learning (Martineau & Hannum, 2004), and at best 'serious play' (Mann, 1996), emphasizing the instrumental value of *learning by doing*, leaving less room for imagination and curiosity—key components of open-ended play.

Oftentimes, the aforementioned goal-driven perspectives on learning tend to put less emphasis on imaginative and open-ended interaction and engagement with physical objects and everyday materiality, i.e., *doing by playing* (Heljakka, 2023). Consequently, studies focusing on the material aspect of adult creativity and on tools that support creative playful learning in the adult context are scarce. To contribute to this gap in research, the explorations described in the article offer food for thought how creativity can be triggered, facilitated, and enhanced with the help of simple physical materials, such as paper technology.

### *From imaginative play to ideas and artifacts*

"Play is of the mind," states Brian Sutton-Smith as documented by Dorothy Howard (cited in Darian-Smith & Factor, 2006, p. 6). Play has a natural outcome for helping to generate ideas, solve problems, and promote critical thinking skills through specific and diverse exploration of materials, the environment, and the interactive complexities of the two (Hutt, 1979; Pepler & Ross, 1981). What separates creativity and play, however, is that play creates *possibilities* and creativity produces *ideas and artefacts* (Power, 2011, p. 316).

Play is prominently made up of inquiry and invention (Engel, 2019) and as result, creative playful learning as a form of cognitive and bodily engagement with tools and learning tasks differs from being entertained by worlds, models, stories, and solutions created by someone else: "The terms of play and learning (*things that you do*) offer a different perspective from entertainment and education (*things that others provide for you*)" (Resnick, 2006, p. 3). When combining play and creativity with tangible tools, we arrive at the notion of creative play, a useful starting point for conversations around playful learning with physical materials.

Creative play allows new responses, the transformation of information, and the awareness of new connections with an element of surprise. It enables players to design, explore, try out new ideas and use their imagination by using various tools, props, and equipment. (Back et al., 2017) Alongside Sutton-Smith's idea about play being 'of the mind' as cited above, we may argue that *play is often in the materiality of things*.

Despite the ongoing digitalization of play cultures, the importance of the material dimension of play is not diminishing, and playful engagement with materials integrates aspects of object play that is both exploratory and creative. Creative play is self-expression through any medium, making things, changing things (Hughes, 2002). Creative play is the primary play activity supported by open-ended playthings, such as games like Minecraft, and physical toys, such as LEGO (Back et al., 2017).

Materials incorporated in design impact behavior and activities (Södergren, 2020). This article goes further by arguing that materiality itself is a precondition for some form of creative playful learning to happen, and in this way, directs attention to the necessity of allowing adult participants to have access and possibilities to engage with physical materials in co-creative situations.

Playing with artefacts and materials outside of ready-made playthings produced by the industries of play (Heljakka, 2013) also calls out for other explanations of play: As a starting point, the concept of *object play* is particularly useful when investigating the playful nature of adult engagement and creative playful learning with physical materials: Object play refers to play which uses infinite and interesting sequences of hand-eye manipulations and movements (Hughes, 2002).

Since materiality impacts on both creativity and object play and incorporating the play with materials can lead to unique and creative solutions, we arrive at the idea of *combinatory play* as a fruitful avenue for playful learning. Albert Einstein (1995) has said that combinatory play seems to be the essential feature of productive thought. Combinatorial play would appear to be an important ingredient in imagination for rearranging known facts and a necessary condition for producing unique solutions to existing problems (Lieberman, 1977, pp. 149–150). In parallel to the cognitive aspect of problem-solving, the material aspects of combinatorial object play also contribute to the creative process. Riede et al. write:

> […]making play objects and/or facilitating object play allows experimentation with the mechanical and material properties of substances, components, and wholes. The physical resources, including play objects, that adults use to furnish their youngsters' ontogenetic niche have, we propose, a significant structuring effect on the likelihood that children, adolescents and the adults they become will innovate. While intentional teaching and pedagogical interventions create and maintain long-term traditions, playing with things acts as a primer for innovation within the attendant formal technological domains. (Riede et al., 2018, p. 55)

The use of sensory-rich and therefore stimulating tools reminiscent of 'loose parts' play—indicating play with material elements, which can be moved, manipulated, controlled, and changed in play (Daly & Beloglovsky, 2015)—are considered of value for the playful learning of adults that involve elements of physical materiality. Here, interaction and engagement that begins with object play, leading to exploratory and combinatory play to arrive at creative play, are further combined with the idea of playful learning with physical workshop materials (see Figure 1.).

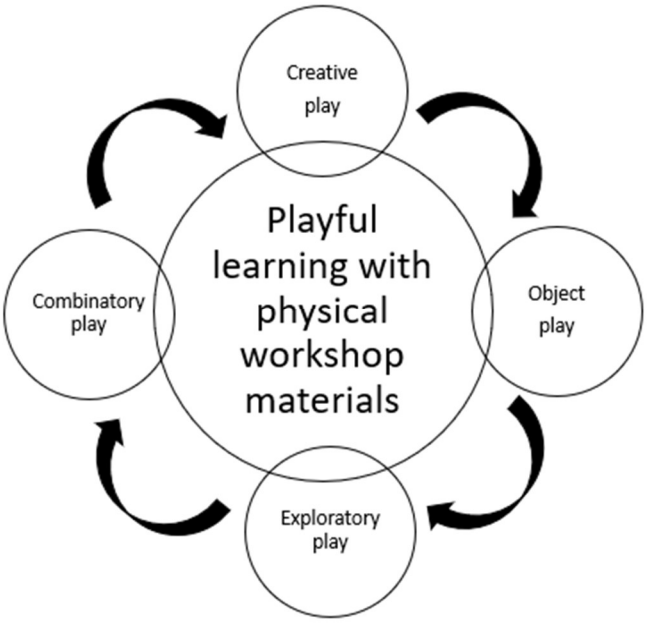


*Figure 1. Forms of play in creative playful learning with physical workshop materials.*

## Creative play with tangibles

All forms of play honor novelty in using, manipulating, and recombining existing structures (Riede et al., 2018, p. 48). Let us, for a moment, consider the potentiality and play value of tangible objects, which is embedded in both imaginative and multisensory interaction with materials:

> The materials to bring out our inner feelings and ideas or, in the words of design specialist Jon Kolko (2010), ideas are 'externalised'. Ideas become tangible and can be shaped and sharpened, possibly through conversation with other people. It is also through the use of concrete, tangible materials that reflection-in-action frequently occurs, leading into new ways of approaching the situation at hand. Tangible materials access more senses in the play activity. (Gudiksen & Skjovberg, 2020, p. 33)

In the following, we will advance to consider tangible materials with a particular geometrical shape, namely blocks, which have inspired the tool under closer inspection in this article—cardboard cubes.

Cubes provide "multiple access points" (Hornecker, 2005). Similar to blocks, cubes improve spatial processing (Whitebread et al., 2017). Earlier studies describe, how toy blocks, in addition to household objects, can be interesting for a child to examine and explore, especially if the child observes adults using them (Healey & Mendelsohn, 2019).

Block play represents embodied interaction, which has been defined by Dourish (2001) as the creation, manipulation, and sharing of meaning through engaged interaction with artifacts.

> Playing with blocks is thought to lead to learning about: the physical properties of objects, hand-eye coordination, cause and effect, object permanence, and specific concepts related to shape and gravity […] Block play is frequently cited as a free play activity that can provide contexts for planning, problem solving and posing, communication and collaborative skills for and between children. (Yelland, 2011, p. 6)

As observed by Sutton-Smith (1968) block play in childhood can produce both "frequent" and "unique" solutions. A study with children showed how blocks afford construction play with various degrees of creativity involved, referring to *Frequent* use of blocks: Play with, build with, make bridges, things, walls, roads, houses, and buildings, and *Unique* uses of them: To make screens, court, shelves, shapes, pyramids, flags, signs, beds, triangles, chairs, couch, steps, people, rocket, gun, fence, piano, tent, square, milk carton, paint easel, cages, statues, throws balls at, put over ears, clap them, smash insects, slide on.

The cube format has longstanding roots in the history of play, and their simplicity, familiarity, and ease of use speak for cubes as play(ful) tools that stimulate design creativity and co-creation (Antle et al., 2011). When considering the potential of the cube format from an educational perspective, it is important to pay attention to its capacity to promote social interactions and active, engaged participation (Eagel, 2012). Ullmer and Ishii (2001) have noted that this tangible format, which invites touch, also supports peer collaboration and facilitates communication.

### *The limits of blocks and bricks*

In the contemporary western world, playthings are most often commercially produced and infant and toddler play with (wooden) blocks is often replaced with building with (plastic) bricks when children reach a higher age. In the context of adult learning, play, or building with bricks is a more recognized type of creative play, often facilitated as part of workshops with expectations to produce 'serious' outcomes. For example, LEGO Serious Play (e.g., James, 2013), as the term says, is a serious approach to using a construction toy familiar from childhood in the context of adult working life—particularly in the realm of business and organizational life.

Research on applications of the LEGO Serious Play (or, LSP) concept have demonstrated the approach "to have value within the commercial environment, particularly when focused on business strategies" (McCusker, 2014, p. 35) and in the educational context, workshops using this methodology has helped participants to achieve a state of flow. Although McCusker (2014) acknowledges the possibility of using more affordable materials like pen and paper instead of LEGO bricks, the concept of three-dimensional paper technology like the cardboard cubes introduced in the article at hand, is not considered.

To contribute to the discussions around the importance of physical materiality as part of creative playful learning, this article seeks to challenge the dominant position given to the familiar construction system based on bricks mainly due to the limitations it has on creative manipulation. To begin with, plastic has its limits for use in a public learning context. What might be appropriate to do with LEGO for the sake of artistry (painting over it, gluing pieces together, or cutting them to modify their appearance), is questionable in a workshop setting with limited material resources and tools. In other words, the solution space for using LEGO is limited by the physical affordances of the brick, namely, its physical form, material and size of the individual bricks. As suggested in the following, material interventions such as tools based on simple, malleable, and cardboard 'technology' suitable for creativity, co-creation and even physical construction, offer an understandable, yet curious interface for experimentation. Therefore, it is beneficial to bring to the fore experiences gained with other types of playful tools, as highlighted in the following part of the article, focusing on the research method and *Comicubes* prototyping tool (Heljakka, 2014) as an example.

## Method

This article focuses on the materiality of adult playfulness and playful learning in association with the Comicubes in the co-creative contexts of workshops. In the following, we aim to make a synthesis of our four case studies illustrating the use of the Comicubes.*

The Comicubes combines two-dimensional sketching with a three-dimensional and open-ended play medium– the cube. The Comicubes tool is a tangible physical object employing a simple material like cardboard (Poulsen, 2020). The tool affords various forms of interaction, depending on its users' age and skills and the scale of the cubes used.

The physical Comicubes prototyping tool consists of foldable cardboard template with six sides each. Consequently, in the double-sided version there are twelve information layers to fill with either images (such as photographs), hand-drawn doodles, pictures or text (letters, onomatopoetic utterances or words), or, as in

* The Comicubes tool and method has its beginnings in artistic work. In 2014, while studying the shared affordances of comics and toys, the author produced a 'toyified' comic-game, featuring 24 printed cardboard cubes with various information on them, which was named Comicubes. The end-result of a course in comic's expression was turned into a workshopping tool in its blank version as the author became interested in the potentiality and possibilities of the universal geometrical shape of the cube.

classical comics, juxtaposed and serial images together with text.

The Comicubes may be considered an experimental plaything, and the perspective of playful learning in the adult context, a learning tool. The cube, as a shape has its point of origin in a physical object but is used today in both material and digital contexts as a basis for different play ideas (Heljakka & Ihamäki, 2017). The advantage of cardboard cubes compared to many other materials used in prototyping is their capacity to be enhanced with various textural dimensions or layers of information, whether physical or digital.[†]

Both physical and digital manipulatives can require bimanual and haptic interaction skills and the facilitation of spatial tasks (Zaman et al., 2012). "Thinking in three dimensions or multiple modalities pushes creative and critical thinking and allows more opportunities for students to learn with and from one another" (Honeyford & Boyd, 2015, p. 71) In our thinking, the Comicubes offers itself as a novel strategy of communication relating to co-construction and co-design of materials, as proposed by Holflod (2022), and consequently, one pathway to a play-rich environment within the educational setting. In this way, we acknowledge the playability and play potential of the Comicubes, as it opens up new possibilities for open-ended and creative play usually associated with the three-dimensional toy-form of the cube (Heljakka & Ihamäki, 2016), combining the forms of object play, exploratory play, and combinatory play to arrive at creative playful learning.

In previous work, Comicubes have been used in workshops with various user groups in the contexts of early education, art, design, and higher education, in which its capacity to prompt creative thinking and playful actions have been observed. In the workshops, the prototyping tool has, for example, been described as "a lubricant for creativity" (Ihamäki & Heljakka, 2020a).

Playful learning methods often accentuate creativity as a way of behavior and it is often collaborative, as groups stimulate creativity (Burke, 2011). To exemplify, the main goal of co-design methods is to facilitate creative collaboration in the generation of ideas and artifacts (Brandt & Messeter, 2004).

Put into play in engagement with physical materials, workshop participants need guidance in setting the goals for their designs built with the given materials during the workshops to answer questions, such as: What is the firsthand goal of the outcome of the designs? Is it to enhance the participants personal understanding of a

[†] By adding a digital layers to the Comicubes, such as QR codes, the cardboard cube may become a hybrid plaything that acts between material and digital worlds. This means that the cubes can be read by a mobile application, which scans the code and takes the user to different digital environments. This added material can be for example videos, music, photographs, text and/or links. (Heljakka & Ihamäki, 2016).

theoretical concept (such as answering the question, "What is play?"), or is it to communicate ideas co-created in groups to present and discuss possibilities of the outcomes of interaction design (such as creating physical models for playful experiences)?

Bekker, Schouten and de Valk (2020) point out that

> What distinguishes […] the play design methods from mock-ups, sketches and prototypes are partly the layer of rules and procedures and partly the application of interactive feedback techniques to enforce these rules and procedures. Even in self-invented play situations, players instinctively begin to work towards more rules and procedures. (p. 24).

This is to say that engagement with even open-ended physical tools such as the Comicubes may result in goal-oriented co-creation, just like what happens in playful learning with pre-determined challenges to solve.

We have used blank Comicubes to facilitate co-creation to generate new ideas, solutions or approaches to various design challenges related to designing and constructing three-dimensional mock-ups. Although the Comicubes have been employed both as a tool for three-dimensional mind-mapping of concepts (such as the customer journey), it has mostly been used to model interactions between users, artefacts, environments, and services following the realms of product and service design (creation of toys and games), and the design of 'playified' services and spaces (playful environments both offline and online).

## Findings

Next, we will present some findings in relation to how the Comicubes allowed the participants to build their creative concepts and physical structures promoting their playful learning in four workshops. The questions under scrutiny in this study are: *how* do physical materials like the Comicubes serve adult participants in a workshop setting meant for playful learning? And, how does the creativity of adults emerge in such settings with predefined goals related? To answer these questions, the author aims to produce a meta-review of (both published and unpublished) research highlighting the productive aspect of creative play with physical materials and demonstrate their suitability to be used in playful learning with adults.

All case studies conducted in Finland during 2016-2022 represent experimental research interventions, which have been designed and executed by the author with colleagues and which aim to produce playful learning in participants. In the four case studies presented in the following, the Comicubes was tested both as a method suitable for learners of different ages and as a playful tool encouraging co-creative approaches. Next, the article at hand shares some of the lessons learned during the multiple workshops organized leaning on previously

published research cases and yet unpublished studies.

## Workshop I

In the first workshop, we facilitated playful learning by designing and building prototypes with toys and games first with preschool children and then with students of higher education (from the area of teacher studies). With children, we have used a guided, but open-ended experiment, which has given the participating children the freedom to use the Comicubes as both an ideation tool, or to use multiple cubes to build actual toys (or models) of them. This initial workshop inspired the following one with students coming from the field of teacher education. With the young adults involved in higher education the participants were asked to ideate and create mock-ups for board games. The results of these playful learning situations have been reported in earlier publications (Heljakka & Ihamäki 2017; Ihamäki & Heljakka, 2020b). The findings of the two studies accentuated how the paper-based tool that the Comicubes is, offered the workshop participants a material resource to write, draw, and glue information on the three-dimensional cardboard structure. Whereas the children operated a maximum of two Comicubes in order to create their toy designs, students of higher education showed more complicated game designs including multiple cardboard cubes. Together with envisioned rules for interaction, the students ideated games for social play with the cubes that involved finding information from inside the cubes through opening up one side of the cube, or seeing through the cube from a hole cut on its side (and in this way, illustrating the creation of many more affordances[‡] and consequently, more play value for the hollow cube). In this way, the adults used more creativity in manipulating and altering the cubes, imagining more forms of interaction to arise from their designs.

## Workshop II

The second workshop facilitated playful learning with the Comicubes by re-creating the airport security checkpoint by playifying it. In this workshop students of higher education from the area of business studies took part in the context of a course in marketing and, during the course, received information of the playfication

‡ Affordances name the range of apparent possibilities that an object or device is capable of performing. See Bogost (2016).

(Scott, 2014) of service design. The findings of this workshop are reported in a publication (Ihamäki & Heljakka 2020a) and demonstrate, how the students who used the larger scale form of Comicubes (measuring 40x40x40 cm), used the cubes for two purposes: To showcase their conceptual ideas on the playified versions of the airport security checkpoints, the students, working in groups, used the Comicubes as a three-dimensional mind map to enhance their presentation of the ideas: The cubes were written on with different information shown on each side. During the presentation of their concepts, the students rotated the cubes as they advanced with explaining their ideas. Again, some of the other groups used the Comicubes to build up large scale spatial prototypes and physical models of the security check points, which they then used to demonstrate the various touch points for their service designs. In this way, it became possible to see the functionality of the cubes as a demonstration tool and a basis for a spatial prototype for the uses of service design.

### Workshop III

In the third workshop, playful learning was facilitated with the Comicubes in envisioning and creating the design for an immersive museum. This workshop involved students of higher education from the area of humanities. As part of a course called the "Playful Museum", the playful learning aimed at understanding how to design customer journeys for playful museums of the future (Heljakka, 2023). This study conducted during the course drew on playful approaches that can be utilized in the design of new types of museum experiences. During the course offered by a Play Laboratory based in Finland, the students first learned theory on playification (Scott, 2012), the dimensions of the play experience (Heljakka, 2018) and the service design concept of customer journeys (Hollins & Shinkins, 2006) and then co-created concepts and physical prototypes for the museum space in groups. The Playful Museum course employed activating methods suitable for group work, which offered the students a mix of approaches using digital technology as well as the Comicubes. As the end product of the course, each group of the participating students integrated their part of the museum design into a common design, which demonstrated a large-scale physical model for the physical layout and exhibits at the museum. In this course, both small-scale (10x10x10 cm) Comicubes and the large-scale format of them was used. A unique solution how to use the cubes in this instance, was the students' decision to use some of the cubes unfolded and flat, producing a novel way of approaching the cubes as a demonstration and construction tool.

## Workshop IV

The fourth and final example of a playful learning situation was a workshop with the aim of designing future robotic friends with the small-scale Comicubes. This workshop intended for both children and adults offered situations for intergenerational learning with physical materials. The findings of this workshop have not been previously reported in terms of the use of the Comicubes tool. However, one publication acknowledges the capacity of the tool to invite speculative conversations around affordances of future robots (Heljakka, 2022). In this workshop, novel uses for Comicubes were illustrated by attaching more dimensions to the cubes by gluing stickers (to express facial features) and adding extensions to the cubes as "hands" for the robots, to enhance—"anthropomorphize", "humanize" and "cutify" –the abstract, geometrical shape of the cardboard cubes, to project human-like characteristics on the social robots envisioned.

## Discussion

This part of the article introduces the triad of stuff-mess-wonder, which summarizes and discusses the key findings of interaction and engagement of workshop participants of creative playful learning situations that have employed physical materials. The section offers ideas on what could be considered in the design and future applications of playful learning of adults with simple physical and paper-based tools like the Comicubes presented in the article.

### *Stuff*

Working with physical tools and materials is an essential part of playful learning as shown throughout the article. Wohlwend points to the writings of Randy Bomer (2003), who turns his attention to the form rather than the function of the tool's "robust materiality" (p. 231). We propose that these resources can be understood as *stuff*. The 'stuff' used in playful approaches may come in materials of different texture, size and weight. Cardboard cubes are 'simple, subtle, and inexpensive' in similar terms that Kudrowitz and Follett (2014) describe other playthings with value (see Figure 2.). As a tool with a familiar shape that already carries initial play value in it, the Comicubes propose "a creative physical platform that encourages design thinking, allows for playful manipulation, and invites interaction" (Heljakka & Ihamäki, 2016). As illustrated in the findings of the four workshops, the creativity expressed by the workshop participants comes across in how the robust materiality of the cubes is challenged and cultivated in many ways.

While Comicubes of the small-scale form are easy to print out, light-weight and thus easy to transport and carry, they offer an economic and ecological resource for creative play. The 'stuff' of cardboard, and the technology of the format printed on paper material makes the Comicubes accessible as well: one cube only is sufficient as a starting point in a workshop, but as the number of the cubes is increased, the participants may approach it similarly to a whole construction system. Consequently, the possibilities to add more dimensions to designs and interaction increase. Moreover, as Franzén et al. (2020) have shown, a playful approach including use of large-scale physical materials can facilitate improvisation, collaboration, creativity, physical movement and collective problem-solving in the adult learning context. One quote from student feedback describes the use of Comicubes as 'stuff' that comes in various sizes and advances the *doing by playing*:

> It was nice to demonstrate the design [of the playful museum space] first with the smaller cubes and then use the large ones [Comicubes] in the classroom. The cubes were a workable tool and we used them both in their two-dimensional [flat] and three-dimensional formats. (Student feedback from the Playful Museum Course)

In this way, not only the number and volume, but also the size of 'stuff' matters, as our bodies interact differently in terms of physical movement in space with three-dimensional tools of different sizes.

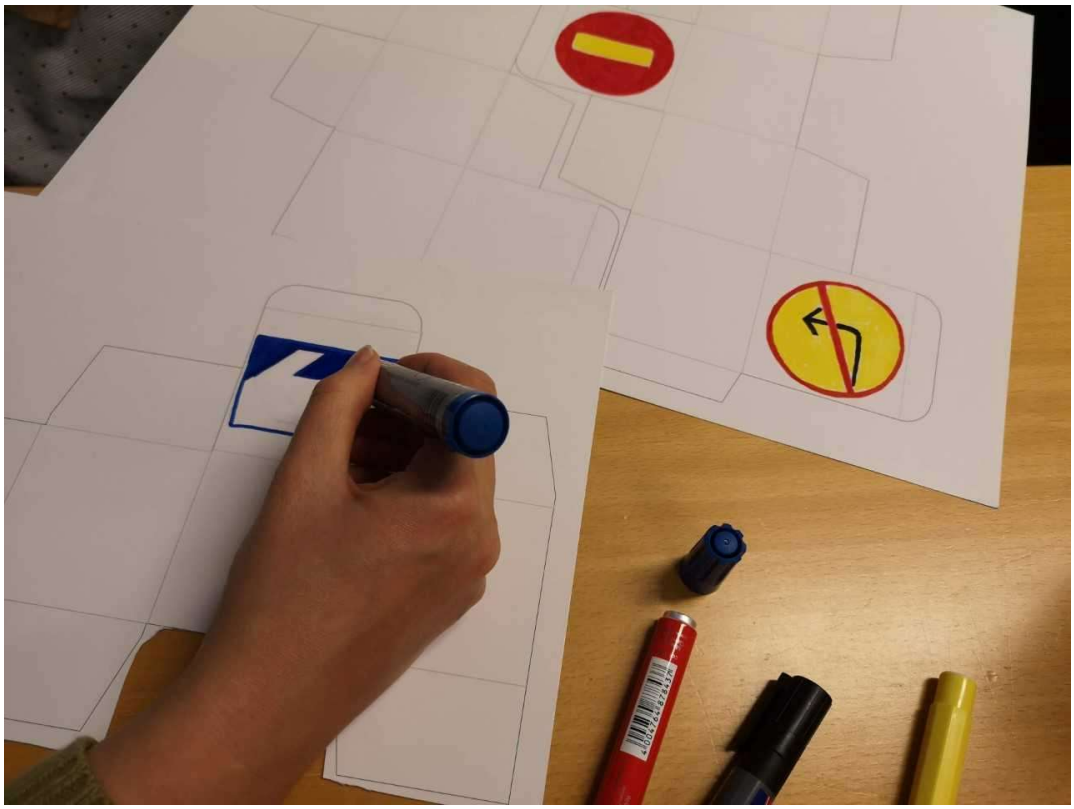

*Figure 2. The 'stuff' of cardboard cubes in unfolded, two-dimensional shape.*

### *Mess*

Dearybury and Jones (2020) have described creativity as an idea in motion. "Thinking in three dimensions or multiple modalities push creative and critical thinking and allows more opportunities for students to learn with and from another" (Honeyford & Boyd, 2015, p. 71). However, physical 'stuff' alone is not enough, there also must be space and some goals given for the interactions with materials as well, in order to see meaning in the 'mess' created. Wohlwend (2008) points to the "messy wonder that regularly occurs during child-directed play and exploration" (p. 127).

Putting materials in motion may create a temporary mess, which challenges the innate orderliness and ascetism of common learning environments. When we aren't afraid to play, we mess up, learn and repeat. Instead of being afraid of the *mess* produced as part of playful learning with physical materials (see Figure 3.), we should "embrace the perceived chaos as part of the learning experience. (process)" (Dearybury & Jones, 2020, p. 24). Indeed, play as part of leisure can be more about the process than the outcome, but unavoidably and inevitably, play with 'stuff' in a 'serious' context such as playful learning produces 'mess' as well: Expressive interactions are those interactions that leave a sign of activity in their surrounding environment. Everyone is able to leave these signs of activity, regardless of skills or experience (Södergren, 2020, p. 117). Playful learning with physical materials often manifests as a collective endeavor and the 'mess' multiplies in due course. According to student feedback, the use of the Comicubes has assisted the creative process, including the multiple ways of using the cubes:

> What assisted the creative thinking and project work was also the various and many-sided ways we ideated in the groups, such as the cubes we used. (Student feedback from the Playful Museum Course)

What we have learned in the workshops explained above, is that it is beneficial to develop a tolerance for 'mess' that is generated in playful learning. Furthermore, interacting with 'stuff' has implications on physical space, and player movement withing that space. Franzén et al. (2020) have noted how the role of bodily engagement and use of physical materials and space have seldom been examined in scholarly work on university teaching. Our workshops show how large-scale physical materials have an impact on the use of space; creative players as part of playful learning show a freedom in how to approach 'stuff' to arrive at 'mess' when bodies entangle with physical materials. In this process, new ideas and thinking are produced, necessitated by the playful tools like the Comicubes addressed in this article.

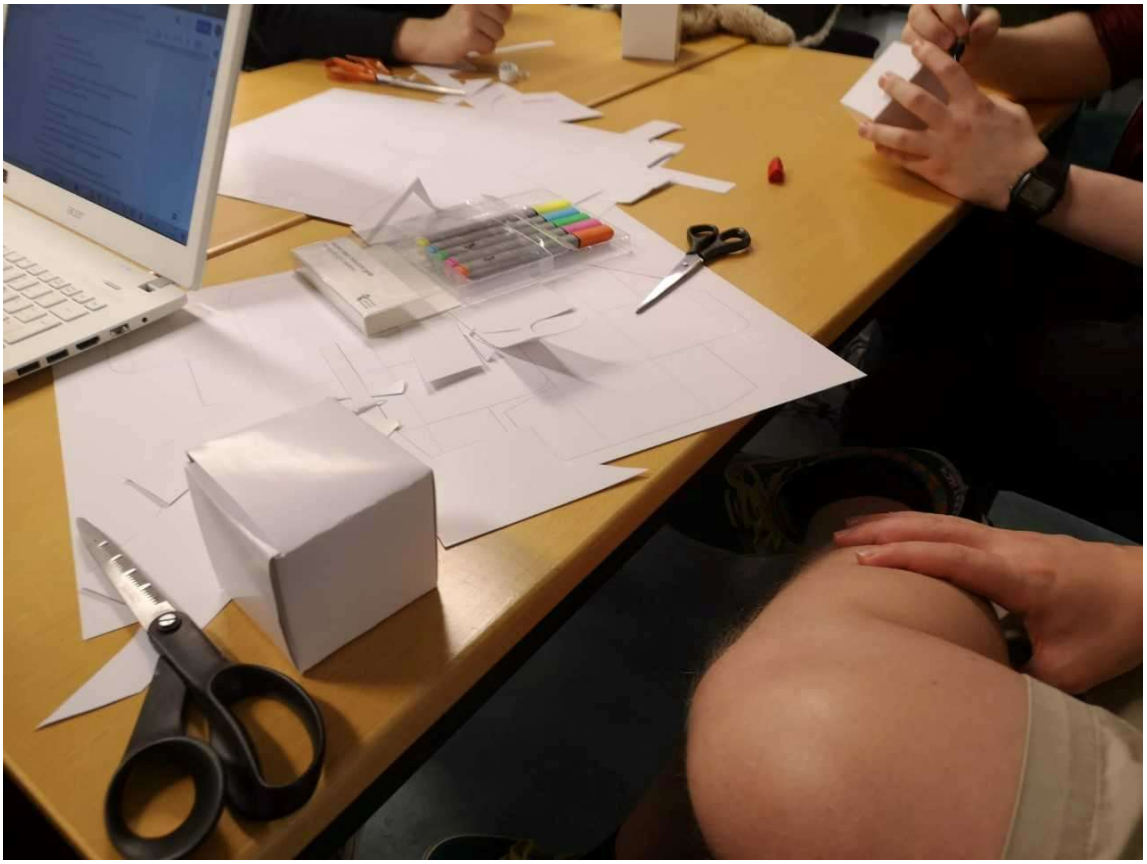

*Figure 3. The 'mess' of cardboard cubes, partly folded into three-dimensional shape, and enhanced with other materials.*

### *Wonder*

Sutton-Smith (cited in Darian-Smith & Factor, 2006, p. 6) states that play, humor, true pretend, and dreams permit the mind to go anywhere. And the ability to make the mind wander through the imagination in able to awake wonder are needed in play. Eichberg (2015) points out, how "play raises new questions: Play is to laugh—it is to question—it is to produce" (p. 93), and this is by no means exclusive to children. "In university teaching, playful learning contributes to students' problem-solving skills, creativity, foresight, as well as their ability to see things that do not yet exist." (Franzén et al., 2020) As suggested here, creativity may be invited, facilitated and enhanced by using physical materials that may be turn to objects as part of creative endeavors. Objects in themselves limit the solutions space due to their structure, but also open up possibilities for various play forms to occur. Matters of play allow manifold actions, especially if their use is guided and constrained by challenges given in the context of creative playful learning.

Results of earlier research on the Comicubes indicate that a combination of pleasurable and creative elements causes a sense of deep enjoyment so rewarding that participants feel that manipulating Comicubes is worthwhile simply to be able to have a creative experience. Creative play with materials is, indeed, a *productive*

activity. This calls out for stressing the *wonder* aspect of playful approaches. Wonder can be understood as a positive, almost overwhelming reaction to what is produced in play.

Dearybury and Jones (2020) write, "DeBenedet identifies five qualities of influence on overall happiness and well-being: *imagination, sociability, humor, spontaneity*, and *wonder*" (p. 11). "Curiosity spurs action, but the kind of wonder Dr. DeBenedet is referring to is the kind that stops you in your tracks. It's awe" (p. 18).

The findings of the workshops illustrate that the ways to using cardboard cubes as part of playful learning are seemingly limitless to the extent that the outcomes sometimes surprise the participants themselves as well. It is in the process of meaning making and seeing value in the creative play that we arrive at 'wonder'.

Wonder arises from curiosity and "using the familiar in unfamiliar ways" (Resnick, 2006, p. 9, see Figures 4 & 5). This again, would be much harder to achieve without the 'stuff' and 'mess' presented in the article at hand. Experiencing wonder becomes possible in reflecting on what the stuff and mess of creative play enable, for example, through the end-results of co-creation:

> I liked the group work and that everyone's creations became part of a larger whole when we assembled the physical [version of the] concept in a concrete way in the classroom. (Student feedback from the Playful Museum Course)

*Figures 4 and 5. The 'wonder' of the creatively enhanced cardboard cubes, in small scale (left) and large scale (right).*

## Conclusions

This article has sought to offer new insights on the material dimension of playful learning in the adult context. The mosaic of workshops summarized in the article concentrate on the use of playfully inviting paper technology—the Comicubes as a tool for creative playful learning. To highlight the connection of Comicubes

with creative play employing historical and popular playthings—blocks and bricks—the history of toy blocks and construction systems was briefly covered. To continue, the author illustrated how in the use of cardboard cubes as part of creative playful learning with physical materials, unorthodox uses of block play are realized. As shown, cardboard cubes offer a vast and infinite solution space.

In the article, the author has noted the gap in previous literature in clarifying the significance of robust physical materiality to adult playfulness when approached from the direction of creative playful learning and the triad of stuff-mess-wonder. By consulting and synthesizing earlier work the author has conducted both with children and adults, four examples were discussed by focusing on the uses of Comicubes as a material and tangible learning tool. Through this meta-analytic approach, the author wished to bring to the fore the three key phases of working with physical objects—the stuff, mess, and wonder of engagement with a toy-like structure, the cardboard cube.

Obviously, the *stuff* points to the physical tool itself, in this case, the Comicubes. As suggested in the article at hand, using *stuff*, such as simple, subtle and affordable cardboard material for construction and creative play with the cube, and then put it into play as part of the workshops, detaches the tool from ready-made, commercial toys, such as plastic bricks. In its physical form, the Comicubes tool presents an ecologically sustainable, economically sound, and potentially more inclusive ideation tool than the more expensive plastic bricks often used as design tools.

*Mess*, again, refers to the temporary unruliness of play that arises from putting the material into object play—exploratory, combinatory, and creative play by adding elements to the article cube by gluing, drawing, doodling, and writing, by challenging and re-inventing its material dimensions by, for example, cutting it, and by making constructions with the cubes through using it as a three-dimensional mind map—building prototypes of various size and scale. Furthermore, 'mess' is generated as participants of workshops operate within physical space and interact with large-scale materials.

Earlier research proposes that the Comicubes concept has the potential to function not only as a physical, playful platform that invites users to design and to co-create toys and games, but also as a conceptual tool that may be used as an easy-to-use, ecologically sustainable, economically sound, and therefore inclusive ideation tool in interaction design, as it facilitates communication and collaboration—and most importantly, creativity (Franzén et al., 2020). Furthermore, creative play with cardboard cubes entails tangible, embodied, and spatial interaction that essentially, produces experiences of wonder—moments of surprise and delight over the creations generated.

To play, in essence, is not only about imagining, but also about trying out. In all of the four workshops, Comicubes invited the participants to play with physical materials and to create new ideas. With the

Comicubes, the creativity manifests through the making of mess—interaction with and enhancement of the physical material—the doodling, drawing, painting, cutting, building, gluing, constructing, combining with other objects, and mobilizing the material—by blowing, tossing, kicking it, and seeing how far it goes in the name of creative play. In sum, as an example of physical play(ful) material, it can be used to capture insights gathered in a workshopping context, into three-dimensional objects with original play value that can be enhanced.

Ultimately, the materiality of playful approaches used with adults can be economical, ecological and in these terms, an ethical and therefore, a sustainable choice—as adult creativity is invited to play with simple and accessible paper technology, for which the play potential and play value is still high.

Although the article has introduced the reader to the Comicubes as a simple prototyping tool representing paper technology and, simultaneously, a workable method to be used as part of playful learning in the adult context, it needs to be accentuated, to be playful with materials does not always call out for specific learning tools. Even the simple cardboard box as scrap material can be a useful tool for playful experimentation.

However, based on the findings of the workshops, it is suggested that more conversations are needed around the tools (and their physicality—material, texture, weight, and size) used for playful learning in the adult realm. What we have learned from the workhops as playful interventions organized, is that what matters is both the openness and size of the physical material: While engagement with small-scale cubes means training of fine motor-skills for the youngest, operating large scale cardboard cubes widens the possibilities for embodied interactions at every age, turning attention from the materiality of learning tools to affordances of the learning space through building and construction activities.

Not only does the interaction with cardboard cubes promote possibilities for cognitive enjoyment—it also offers the gratification of touching and handling a familiar material from activities of childhood arts and crafts—cardboard—through sensory stimulation. While this kind of reaction may be a highly individual response, more in-depth, qualitative research is needed to understand the aspect of playful learning using other physical materials as a collective and co-creative experience. Moreover, as illustrated, it is also beneficial to highlight the value of the materiality of playful approaches in association with intergenerational activities (such as in Workshop IV), where the purpose is to transfer knowledge between generations through working with the same tools.

The key is to understand and value the processes and products of playful learning equally by allowing them to manifest as part of the adult learning and working contexts, as crucial components of creativity. Daniel Hjorth has written: “When creativity is crowded out from work through managerial practices prioritizing predictability and control, risk, play, desire, and adventure are lost.” (Hjorth, 2005, p. 397) This could be

avoided by asking the learners themselves: What is the value of wonder in the context of playful learning of adults? What can be noted, is the productivity of play in learning situations. In play materials are turned to constructions and ideas are born. Play not only enhances the materials we engage with in various ways, it also moves *us* in many ways—physically and cognitively, often enhancing our creativity and thinking. This is the ageless wonder of creative playful learning with physical materials.

Besides being intangible, play can manifest as a highly material experience. Object play perceivably influences our environment, creative capacities, and in this way, advances the flexibility of both our reasoning and imagination. It is for this reason more exploratory research is needed in the area of playful adult learning and three-dimensional tools.

Finally, approaches focusing on creative play in adult learning require time, space, openness, flexibility, and tolerance from the organizers—the capacity to see value in the stuff, mess, and wonder that play usually brings to learning situations no matter the age of the participants. All these phenomena relate to play. And although play is a fluid, ephemeral and constantly evolving phenomenon in the world, it also leaves its mark in the players' minds, social interactions and the environments it manifests in.

We end the paper with a final note by referencing Dearybury and Jones (2020, p. 49), who write: "We must not think outside of the box. We must destroy the box". I suggest, on the contrary that we must *recreate* the box, and then—put it to play. This is important for a simple reason: It does not matter whether we use bricks, blocks, cubes, or boxes. But what matters is that we can interact creatively and collectively with them. Play is the highest form of research, Einstein has said. Humanity advances when we play.

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