European Journal of Education Studies
ISSN: 2501 - 1111
ISSN-L: 2501 - 1111
Available online at: www.oapub.org/edu

DOI: 10.46827/ejes.v11i5.5278 Volume 11 | Issue 5 | 2024

CHILDREN AS THE DESIGNERS OF THEIR EVERYDAY LIFE. INTEGRATING DESIGN THINKING IN PRIMARY EDUCATION

Katerina Kokkinaki[1i],
Zoe Georgiadou[2]
[1]PhD Candidate,
West Attica University,
Greece
[2]Professor Dr.,
West Attica University,
Greece

Abstract:
This research examines whether children can acquire aesthetics through design in their everyday lives. Students recycle their old school seats, following their own ideas. The aim of the project is for children to get to know sustainable design through a construction of their own and to work cooperatively, resulting in offering their work to the community. The study comes to answer if children can implement a design thinking project in primary school if they have the ability to become the designers of their own things if they can understand sustainability through design, and if they can work with the intention of offering their project to the community. Students develop thinking and life skills through design thinking, experimentation, and playful art, as well as through sensory and narrative design, two processes that are perfectly natural in the world of children. Participatory work in a collaborative community form helps the children to step outside themselves and acquire empathy for the rest of the school community.

Keywords: design thinking, narrative art, sustainable art, school art, art in primary

1. Introduction

This paper, which is part of one of the projects of the main research, focuses on the issue of aesthetics, which people can easily develop at a young age through their everyday lives. Therefore, art is not a field to be dealt with exclusively by experts and those with specialized knowledge. This research follows the framework of action research in a primary school group, through the project-based learning method. Children become the designers of their future, taking into their hand's issues of everyday school life. Through the project, they understand that they belong to a group and that their actions concern

[i] Correspondence: email catykatis@gmail.com, k.kokkinaki@uniwa.gr

the whole community. Students will work within the framework of the social design contribution. They will undertake a relatively difficult task that they will have to face through strategic planning. Design thinking will become the basic tool of the action where it will lead children gradually, through reflection, experimentation, empathy, and play to the result.

2. Literature review

2.1 Aesthetic education of the child as aesthetical experience of everyday life

Dewey (1934) emphasized the relationship between teaching and life, advocating "education as life" and life as continuous reconstruction and transformation of experience. Therefore, if teaching is separated from life experiences, learning cannot be holistic and global. In other words, teaching must promote empirical learning within the broader context of life as it is experienced by students.

Dewey stated that we should abandon the notion that lessons are something fixed, prefabricated, and already formed, outside the child's experience, but to perceive them as something flowing, embryonic, and vital. On the other hand, Vygotsky believes that art should promote everyday emotions by turning them into creative experiences. The purpose of aesthetic education according to Vygotsky is not merely the child's contact with the accumulated human experience in the field of art, but the aesthetic transformation of the reality that surrounds the child (Dafermos, 2002, p.88).

Duncum (1999) argues that the usual, everyday aesthetic experiences are more important than the experiences of high art in shaping the personality of the individual. Everyday life provides multiple stimuli in our contact with the world that seem to remain unused, especially at the core of young children's basic education, where beliefs are built and identities are formed.

For Schirrmacher (1995, p.31) a child's everyday experiences offer possibilities that could be included in art. Aesthetic education is not only acquired through the learning process but also through everyday life. Art and culture are not separate from everyday life, they are part of it and are experienced in different ways. It is therefore imperative that school provides cultural and aesthetic education through which, children will not only acquire artistic interests but will become aware as citizens, and will be interested in the space in which they live, both natural and man-structured (Glykofrydi-Leontsini 2006, pp.331-332).

2.2 The need for design thinking in anthropocentric perception

For Retna (2016) design thinking is a distinct way of approaching and solving a problem that requires a systematic process in order to achieve the desired result. Understanding and satisfying user needs, different ways of thinking and innovation are the perceived outcomes of design thinking.

Design thinking can be seen as a reflective process (Retna, 2016) that incorporates critical, analytical (Popper, 1978, p.144), and intuitive thinking (Martin, 2012). Argyris and Schon (1978) argue that all human actions are designed. The objective of design is to improve the environment in which people live and develop, as well as to improve their social relations. Therefore, the cultural development of societies is directly based on design thinking, planning, and the ability of man to shape his lifestyle (Ketikidou, 2021).

Design thinking contributes to the development of empathy and a deeper understanding of others (Anderson, 2012; Brown, 2008; McDonagh & Thomas, 2010). It is a perspective of thinking based on formulating and solving complex problems through an analytical and creative anthropocentric process (Brown, 2008). Empathy through the process of design thinking, teaches students to understand the needs of other people and by extension the realities of other people.

Design thinking asks questions and identifies possibilities and perspectives (Grots & Creuznacher, 2016), emphasizes repetitive processes, collaboration, ideation, modeling, testing through prototypes, and interacting with users (Panke, 2019). It also addresses and uncovers unforeseen problems early on (Fixson & Rao, 2014). As a problem-solving approach, it deals with problems of everyday life and has been tested in various social settings (Rauth *et al.*, 2010), but also in areas outside of design (Dorst, 2010; Mosely *et al.*, 2018), such as in engineering, business environments, education, medicine (Lindberg *et al.*, 2011; Lor, 2017; Razzouk & Shute, 2012), healthcare (Duncan & Breslin, 2009), sociology (Brown & Wyatt, 2010), and business administration (Brown, 2008).

2.3 The importance of design thinking in children's education

Ulrich (2015, p.175) states, "*I believe that every member of society would benefit from being design literate. Design should be a key component of primary and secondary education. Design is enjoyable for most children*". Schools are constantly seeking new ways of learning, to equip students with skills that will enable them to cope with the demands of the twenty-first century, such as communication, teamwork, critical thinking, and creativity (Carroll *et al.*, 2010; Razzouk & Shute, 2012). A promising learning approach focuses on design thinking (Retna, 2016).

Design thinking is associated with the 'problem-solving method' in education, where students through abstract thinking (Pink, 2006) and reflection, understand what they did not previously know, in order to be able to process the multitude of problems that arise in every facet of their lives (Gardner, 2007). In addition, design thinking achieves a balance between converging and deviating thinking (Dym *et al.*, 2005). These basic abilities and ways of thinking lead to knowledge, skills, attitudes, and values (Weinert, 2003). Design thinking has the potential to enhance creativity, problem-solving, communication, and teamwork, as well as empower students to develop empathy for others, within and beyond the community (Retna, 2016; Ahmadi *et al.*, 2019; Collard & Looney 2014, 2018; Calavia *et al.*, 2022).

Design thinking can teach students the way designers think and thus enhance design literacy (Sharples *et al.*, 2016), cultivate creative and critical thinking (Retna, 2016),

and allow them to experiment and fail at an early stage in order to learn from recoverable mistakes. Students will be able to understand a problem, observe, gain an opinion on an issue, design prototypes, and alternatives, try and experiment, fail with support, and then, regardless of the outcome, evaluate and reflect. Lewis (2005) states that what makes design so suitable for infusing creativity in children is its 'openness'. There is more than one right answer, and more than one right method to reach the solution (Grammenos, 2015). It is a process of learning through the motivation to explore, generate new ideas, think creatively, and other metacognitive skills (Noweski *et al.*, 2012).

Brown (2009, p.37) argues that design thinking is necessary for continuous improvement and innovation and not just for designers. Research has shown that the use of design thinking as a basis for a pedagogical framework, has positive benefits, and more and more schools are adopting it in their programs. Design thinking is becoming increasingly important in education because it allows students to develop social skills (Goldman & Zielezinski, 2016; Lor, 2017; Mosely *et al.*, 2018) such as collaboration, empathy, and problem-solving (Brown, 2008; Razzouk & Shute, 2012).

Design thinking which constantly deals with issues from everyday life and reality can be understood as a holistic approach to education. It is interdisciplinary (Mok, 2009), and it also allows students to process information and data from various sciences and learning fields. It is a multifaceted and complex process (Brown & Wyatt, 2010; Dym *et al.*, 2005). The results of various research efforts provide tangible evidence that teaching design and design thinking provide children with multiple benefits (Grammenos, 2015). According to the 'Design Thinking in Schools K12,' there are approximately 170 schools around the world that use it, in some way, in their classrooms as a supportive tool to foster creativity and innovation (Grammenos, 2015).

3. Method

The present project was carried out in the context of the author's doctoral research, along with a number of other projects. The research follows the framework of 'action research' in a primary school group through the 'project-based learning' method. It is a mixed group of 25 children, aged between seven and twelve years old. The programme was approved by the Ethics and Conduct Committee of the university where the doctoral research is carried out, as well as by each parent of a minor child participating individually.

The research applied a scheme consisting of:

- Arts-based Educational Research, which characterizes the specific teaching subject.
- Qualitative and Empirical Research, which offers the method of in-depth observation of the subjects, the typical methodological tools of data collection, and the methods of classification and coding of the data.

Thematic analysis was used to analyse the data. The thematic analysis identifies themes or patterns within the qualitative data collected by the researcher (Maguire &

Delahunt, 2017) and focuses on those meanings that are most suitable for answering the research questions (Braun & Clarke 2012, p.57). It assumes the active and creative role of the researcher, who is developing an interactive relationship with data (Tsiolis, 2014) while at the same time, focusing on examining the different views and perspectives of the participants (Braun & Clarke, 2006).

3.1 The experimental project

Students recycle their old school seats, according to their own ideas, through the design thinking method proposed by Cochrane and Munn (2016):

- Empathy and observation,
- Identification of the problem,
- Conceptualization, generation of ideas,
- Create prototypes,
- Test.

The aim of the project is for children to work with the above-mentioned method, to get to know sustainable design through construction of their own, and to work cooperatively offering their work to the community. The questions raised are as follows:

- Can children implement a design thinking project in primary school?
- Can children become the designers of the things that surround them?
- How children can understand sustainability through design?
- Can children work with the intention of offering their project to the community?

3.2 Action research and collection of results

3.2.1 Approach to the issue

A discussion on contemporary furniture design was held with the students. Gerrit Rietveld's seat, the 'Red Blue Chair', was commented on by the children as a 'skeleton', essentially describing the structural element that supports the seat.

Frank Gehry's 'Wiggle Side Chair' was commented on as 'macaroni' due to its spiral side appearance. Then I encouraged the children to imagine what it would be like if we had similar seats in school. While the younger students treated this case positively, the older pupils responded very nervously that it was not possible, firstly because these seats looked too expensive and secondly that we would subsequently go to the school's nurse because of the dangerous shape of most of them. On the one hand, it is important for children growing up to understand the dangers of their interaction with objects, while on the other hand, it is equally important not to lose their spontaneity, which in time will lead to creativity.

3.2.2 Motive and proposal

On the occasion of some old, broken, and painted school chairs that were in the school, I suggested to the students to modify these seats that were scattered around the school (we had already collected them with the older students in previous days). The children felt a

huge surprise and at the same time, it seemed inconceivable to them that they could intervene with their own seats.

3.2.3 Design and idea exploration

First of all, we should discover an imaginative design for the seats. The children were given a worksheet to prepare their ideas. They had to choose geometric shapes or patterns and form a geometric combination within the 'clouds'. They also had to come up with a color combination. Later on, they had to decide whether to place their ideas on the top or bottom of the chair (Figure 1).

Figure 1: Worksheet, as an idea plan for chairs

3.2.4 Idea processing

Each group shared a chair and they studied the plans from the previous stage. Then, I passed by their workstations and discussed with each group individually about their ideas. They had to decide what they should keep from their drafts. After that the children used markers to draw on the chair the shapes which they would later capture with brushes and acrylics (Figures 2 & 3).


Figures 2 & 3: Designing the themes on the chairs

3.2.5 Reflection, self-evaluation, and corrections

At the third meeting of the group, I had all the chairs set up on the benches in a row and when the students came in, they began to evaluate the results on their own (Figure 4). I explained to them that they should not feel uncomfortable if the results were not satisfactory. Through this process, we can find a better solution that better fits the design we wish to follow. So mostly we made decisions about whether we needed to change some designs, re-color some others, and other minor modifications (Figure 4). Later some seats were completed with recyclable children's clothes and dolls brought by parents from home.

3.2.6 Installation of the project

At the end of the activity, the seats were shared in the outdoor areas where the children sit during breaks and in the school 'hospital' (where the school nurses examined the children) (Figure 4).

Figure 4: Installation with the chairs

3.2.7 Results of the project

Figures 5-10: Renovated chairs by children 7-12 years old

4. Results and Discussion

4.1 Creative storytelling and narrative design

The parents supplied the workshop with recyclable objects. Among them, there were clothes, socks, and soft toys. On the occasion of a 'Nemo t-shirt', a team with a weak effort (they made sea waves but it didn't work for them), managed to solve the problem in an interesting way but also to connect the form with a concept, essentially creating a narrative. The 'Nemo t-shirt' was literally worn on the chair, as the school seats are child-sized. Shortly afterward, a student brought in a stuffed 'Nemo' from the recyclables to place on the chair we were making, confirming that this decision was following the same narrative way of thinking (Figure 11).

Figure 11: The Nemo chair

The sequence was followed by a brainstorming of ideas, by students trying to connect the story of their chair or even form a story linked to its design. Creative storytelling has the potential to enhance the initial process of design, ideas, and creativity. It is not just a script. Manias & Mavromati (2009) say that designers become writers, and as such, they become creative and immersed in the worlds they create. The idea generation process in design is a creative process that borrows various techniques from the arts, including literature, theatre, visual arts, and film arts.

'Narrative', has long been considered an inherent feature in the design process. By using the term 'storytelling' in its literal sense, designers have the opportunity to get closer to the user through stories and thus develop a product or system that is more user-friendly (Childs *et al.*, 2013). When storytelling becomes part of product design, a continuous sense of time is recognised, taken as a greater sense of completeness. As Tully (2012) states, *"Narrative allows us to understand and construct meaning around our needs. For the designer, the story allows for the construction of empathy and emotion"*.

4.2 Design thinking, experimentation, and visual play

Of course, in a project like this, with an increased degree of difficulty, many issues appear. The drawings of the younger children (up to the third grade) were small; they did not realize that they were working on a different scale from the one they were used to. In addition, they did not spread the color well on the chair, that is, the color surfaces were not clean, and they looked as if they were painted slightly 'smudged' (Figure 12). They also misused the acrylic-water analog and as a result, one color ran into the other. The children used to paint on paper, which has absorbency in itself. The children listened and received several corrections.

Figure 12: Trying to paint the top of the chair

Sometimes there were a few modifications, but when children seemed ready to accept more decisive ones, the changes were more drastic. Alternatives and modifications were made in a playful, experimental, and entertaining way. Cutting a T-shirt, playing with the placement of a doll, filling our socks, and painting with a huge brush, of them were surprising in the eyes of the children. As Leverenz (2014, p.9) says, "*You have to find a way to turn students' fear of failure into enthusiasm, on the occasion of experimentation*". Participants are encouraged to embrace failures, learn from them, and iterate based on results. After all, the process of developing a design thinking solution allows for a lot of trial and error (VonThienen *et al.*, 2017, p.5). The creative engagement of students in design through playful art seemed to encourage the natural search for knowledge, without the fear of failure.

4.3 Sensory design in relation to the child's sensory development and embodied knowledge

Students' sensory interaction with the chair design was very interesting. The children touched the seat's materials, caressed the stuffed animals, and compared textures and smells. Students tried the seats during the process of modifying them, so it played an important role in whether a material satisfied their senses to put it on the seat or reject it. Saito (2007, p.20) notes that "*we experience a chair not only by inspecting its shape and color, but also by touching its fabric, sitting on it, touching it and moving it, to get a sense of its texture, comfort, and stability*". And Basoukos (2014, p.63) states "*an ergonomically designed chair leads us to a wide range of bodily sensations*". Gibson (1966) tells us that sensory design considers not only the aesthetic form of things but also how things shape us, our behavior, our feelings, and our truth. The senses respond to a persistent, ever-changing environment. When our body is pressed against the soft surface of a chair, both the body and the chair react. The objects we grasp to use as tools, to bend, to crush, or to join with

other objects and materials, are active extensions of our sense and touch. The design encourages participants to think with their hands and bodies (Figure 13).

Figure 13: Multisensory chairs with the sense of teddy bears

If children learn the world through sensory experience, then sensory design seems to be a suitable method for them to discover how to recreate their world. "*Children, learn, develop, and try to understand the world through their senses*" (Triliva & Anagnostopoulou, 2008, p.59). According to Piaget, children know the world through their senses and actions. Young children explore with all their senses support Schirrmacher (1995, pp.16-18). In childhood, all elements of the environment are incorporated through observation and experience into the child's 'being', argues Magouliotis (2002). Lioliopoulos (2004) says that children should be encouraged to process the objects of the environment with their hands because it is as if the outside world comes into direct contact with the outer layer of the brain since both of them originate from the same skin. According to Montessori, touch and other senses bring the child into contact with the outside world. She believes that the child's development does not take place linearly but through a series of sensory periods of the human mind, because in certain phases of development, the child is particularly sensitive to stimuli from the environment (Pantazis 1997, p.44).

Through the act of creating, managing, shaping, and interacting with various materials, our hands form the connection between the mind and the material. Touch is integral to many, if not all aspects of design. The tradition of phenomenology and embodied theory, describes how we think or create meaning through our physical interaction with the environment. The aesthetic aspect of the design is not strictly defined as a visual expression but rather as a complex language for transmitting important indications and information. Through visual, acoustic, tactile, kinesthetic, or emotional perception, children actively interact with the physical or social environment and increase their aesthetic awareness (Chou & Lee, 2016).

"The qualities of the material space are measured equally by eye, ear, nose, skin, tongue, skeleton, muscles", says Pallasmaa (1996, p.26). Embodied learning is a kinesthetic, collective, multimodal, and experiential process that requires the participation of all parts of the human body to convey messages. As a process, is based on the theory of embodied cognition, that is, the theory that the body affects the mind. Essentially mind and body are in full interaction. Embodied knowledge has its spiritual roots in philosophers Martin Heidegger, Maurice Merleau-Ponty, and John Dewey. Nevertheless, prevailing educational philosophies and practices continue to separate intellectual and emotional abilities from sensations and embodiment. The senses are usually recognized only in relation to artistic and musical education, but not as the basis of our interaction with the world, our self-knowledge, and consciousness. Educational practices usually provide physical exercise for the body, but they do not recognize our embodied and holistic nature. They fail to understand the fundamental sensual and holistic essence of human existence. Pallasmaa (2007) argues that we have not recognized that we are embodied compositions. We may have rejected Cartesian duality, but it certainly continues to dominate cultural and social practices. Our consciousness is an embodied consciousness. He continues by saying, the body is not a locus of cognitive thought, but our senses and physicality, and as such, structure produces and stores silent knowledge. Our entire existence in the world is a sensory and embodied way of being. All our senses 'think' and structure our relationship with the world, although we are not conscious of this constant activity. The sensory and embodied way of thinking is essential in art and any creative work.

4.4 The end of egocentrism and openness to community

In this project, the children did not create for themselves. Participatory work in a collaborative community form helped the children to step outside themselves and listen to the opinions of others. Pestalozzi believes that collaboration makes childish thinking less egocentric. Working in group offsets "*[…] The inability to adopt opinions different from one's own*" says Piaget (1971, p.115). Cooperation can foster all the attitudes that shape critical, objective, and dialectical thinking. When, within a group, individuals are distinguished by their willingness to sacrifice their interests before the interests of the group, when cohesiveness, trust, and solidarity prevail, these actions create an atmosphere, that contributes to the members feeling like a real dynamic group rather than an amorphous mass (Tsourekis 1987, p.139).

The children designed and built for the needs of their classmates, knowing from the beginning that whatever they make, will be offered to the school community. The 'community' framework has as its main focus that all participants work with the idea of improving it (Nastou, 2023). The interaction of the new seats with the school community was impressive. The rest of the school used the seats they found in the school-yard and many times when something broke, they would immediately bring it to me for repair or try to prop it up in a way of their own. According to Wenger (1998), community it is not only individual or collective outcomes, but the result of a combination of both.

Experiential learning is possible within the communities of practice, in which the individual interacts with other members of the community, and their actions become meaningful in its wider context (Lave & Wenger, 2005). The school for Dewey is an embryonic community, which is the miniature of society. In this tiny community, children are prepared for their duties, which they will undertake in real society. He believed that education should not be confined to classroom boundaries, but extended to the wider community and that it should be a collaborative and participatory process that actively involves it.

The teachers were really excited about the project and they expressed their admiration. At the end of the school year, in an informal assessment of the group's projects, they said about the chair project: 'Chairs were utilized instead of becoming garbage', 'A useful object was imaginatively decorated', 'An inventive project', 'The children dealt with a part of their school daily life, felt it as their own and protected it', 'Works of art in which you are allowed to sit', 'A hitherto indifferent object suddenly arouses attention and interest'. Teachers' opinions were very important to support the project. Without their interpretations and admiration, the works would not have the same significance for children. The acquisition of experiences is possible within communities of practice, in which the individual interacts with the other members of the community, and their actions are given meaning by its broader context (Lave & Wenger, 2005).

4.5 Sustainable art in the community

Through the conversion of school seats, students had the opportunity to learn about sustainable design, reuse, and recycling. Children through the experiential and playful way of learning, created a recycled furniture, using as material something of their own, their clothes. The upholstery of the seats has something of their personal life, while the rest of the children 'users' of the student community also identify, with fabrics, prints, cartoons, and other children's accessories, such as socks and dolls. The idea of creating art in a group, in regard to sustainability offers a shared vision that connects people, promoting human inspiration, ideas, emotions, and experiences.

5. Conclusion

In this project, children dealt with a real object from their own daily lives. They worked with it on a real scale, and even young children took over and carried out the activity. Students, through the method of design thinking, clarified meanings and put their thinking in order. The students followed a strategic action, with clear steps and distinct stages, such as observation, reflection, idea generation, implementation, and testing. This method made things tangible and understandable for children. By utilizing the design thinking method, the children experimented with the object, body, and materials. At the same time, they understood the concepts of anthropometry and ergonomics. Watson (2015, p.18) described students' reactions to design thinking, *"I hear students talk about*

using design thinking, giving meaning to ambiguity, empathizing with others, thinking creatively, communicating ideas, collaborating, and making people laugh".

An equally important observation in this experimental project was the development of design thinking through sensory and narrative design, two processes that are perfectly natural in the world of children. The development of the child is directly associated with the material space of its activities and is shaped to a significant extent by the objects that surround it. Children as creative consumers discover the secrets of things around them and at the same time through aesthetic education, they are provided with the culture to judge, choose, and even create the objects that will shape their own world (Liamadis *et al*., 2020, pp.186-192). On the other hand, the design narrative is developed in this project as a method and a tool for the students' creative imagination. The child through an object can narrate and create connections to its life. Participants through a step-by-step process can generate ideas from different areas through drawing, prototyping, and storytelling (Brown, 2009). Gersi (1997) argues that our desire to narrate, helps us to grow and eventually become who we are, our self, and our personality. Narrative by its very basis is a meditative communicative event (Pourko,s 2009, p.421). Blaylock (2003) states that "*storytelling is not a literal representation of what something really is, but rather what it means it is*". Very close to this idea is Vygotsky's definition of symbolic play with objects, who argues that *"In play the child can act according on how it has given meaning to an object and not on the basis of the actual object*" (Papadopoulou 2009, pp.158-159). For the young students, this process from beginning to end was a creative art game, with elements both imaginary and real. In this way, the children were introduced to new, unconventional ways of thinking about design. The aim is for the children to become adults with an aesthetic sensibility, even in the things they interact with every day.

Dewey believed that education should connect to real-world experiences and community challenges, providing opportunities for students to actively participate in problem-solving. Children through design thinking, seemed to learn to empathize with others, to think in terms of inclusion and democratically, and to provide solutions that cover as many needs as possible. Creative work requires physical and mental identification, requires empathy, and compassion, argues Pallasmaa (1996). Children took the initiative for their own everyday environment, cultivating the concept of design and aesthetics. Schirrmacher (1995, p.154) states, *"We hope that young children with expanded aesthetics, will develop into wise consumers and designers for a better, more beautiful and peaceful future*".

Acknowledgements
All photos were taken during the project process with the permission of the parents and the Ethics Committee of the University of West Attica. We thank the children who have participated in the research, as well as the parents and the school administration who made this collaboration possible.

Conflict of Interest Statement

The authors declare no conflicts of interest.

About the Authors

Katerina Kokkinaki is a graduate of the Department of Visual and Applied Arts of the School of Fine Arts of the Aristotle University of Thessaloniki (2008) with a degree in painting and an Integrated Master's degree from the same school. She is a graduate of the Interior Architecture Department of the School of Graphic Arts and Artistic Studies of West Attica University (2000). She is a PhD candidate from 2021 at the University of West Attica. She has taught art in primary and secondary schools for the last fifteen years, such as the Experimental Primary Schools of Piraeus and the Art School of Keratsini. As a visual artist, she has held three solo exhibitions and has participated in numerous group exhibitions, international art fairs, and experimental festivals. She participates in European projects and public opinion surveys. As a visual artist, she has held solo exhibitions and has participated in numerous group exhibitions, international art fairs, and experimental festivals.

Zoe Georgiadou is a Professor of Interior Architecture, Department of Interior Architecture, Faculty of Applied Arts and Culture, University of West Attica. She holds PhD in Architecture and Sociology of Spaces (2001) and a BSc (with integrated MSc) as Architect Engineer (1986) from National Technical University of Athens and BA in Interior Designer (1980) from Technological Educational Institute of Athens. She has taught Interior Architecture and Sociology of spaces at the Department of Interior Architecture since 1981. She is elected academic director of the Laboratory of Design, Interior Architecture and Audiovisual Documentation of the Faculty of Applied Arts and Culture, University of West Attica. She is the Chief Editor of the peer-reviewed international e-journal Arts| Design| Culture, published by the Laboratory of Design and 5 European Universities. She is the author of five books, and several journal and conference articles. She has given invited lectures at universities and is an active member of social co-operations. She has been elected Dean of the Faculty of Applied Arts and Culture for the period 2010-2014.

References

Ahmadi, N., Peter, L., Lubart, T., & Besançon, M. (2019). School environments: Friend or foe for creativity education and research? Resistive Theories, Practices, and Actions, In C. A. Mullen (Ed.), *Creativity under duress in education?* pp. 255-266. Springer International Publishing.

Argyris, C., & Schon, D. (1978). *Organizational learning: A theory of action perspective.* Massachusetts: Addison-Wesley.

Basoukos, I. (2014). The Sensory Experience, Architecture, Body and Perception. Research paper, Department of Architecture, University of Thessaly.

Blaylock, J. (2003). Incorporating narrative into beginning design solutions, Unstaked territory: frontiers of beginning design. Paper presented at the *19th National Conference on the Beginning Design Student*, Oklahoma State University, Stillwater, Oklahoma.

Braun, V., & Clarke, V. (2012). Thematic Analysis. In H. Cooper, P. M. Camic, D. L. Long, A. T. Panter, D. Rindskopf, & K. J. Sher (Eds.), APA Handbook of Research Methods in Psychology, Vol. 2: Research Designs: Quantitative, Qualitative, Neuropsychological, and Biological, pp. 57-71. Washington: American Psychological Association.

Brown, T. (2008). Design thinking, *Harvard Business Review*, Vol. 86, No. 6, pp. 84-92

Brown, T., & Wyatt, J. (2010). Design thinking for social innovation, *Development Outreach*, Vol. 12, No.1, pp. 29-43.

Bullen, M., & Morgan, T. (2016). Digital learners, not digital natives, *La Cuestion Universitaria*, Vol. 7, pp. 60-68.

Calavia, M. B., Blanco, T., Casas, R., Dieste, B. (2023). Making design thinking for education sustainable: Training preservice teachers to address practice challenges, *Thinking Skills and Creativity*, Vol. 47, pp. 23

Carroll, J. M. (2000). *Making Use: Scenario-Based Design of Human-Computer Interactions*. Cambridge: MIT Press.

Childs, P., Zhao, Y., & Grigg I. (2013). Narrative in design development. Paper presented at the *International Conference of Engineering and Product Design Education*, Dublin Institute of Technology, Ireland.

Chou, M. J., & Lee, Y. T. (2016). Research on children's learning motivation and creative thinking in aesthetic learning, *European Journal of Research and Reflection in Educational Sciences*, Vol. 4, No. 6, pp. 23-31.

Collard, P., & Looney, J. (2014). Nurturing creativity in education, *European Journal of Education*, Vol. 49, No. 3, pp. 348-364.

Cochrane, T., & Munn, J. (2020). Integrating Educational Design Research and Design Thinking to Enable Creative Pedagogies, *Pacific Journal of Technology Enhanced Learning*, Vol. 2, No. 2, pp. 1-14.

Dewey, J. (1934). *Art as experience.* New York: Minton, Balch & Company.

Dorst, K. (2010). The nature of design thinking. Paper presented at the 8th *Design Thinking Research Symposium*, pp. 131-139.

Dym, C. L., Agogino, A. M., Eris, O., Frey, D. D., & Leifer, L. J. (2005). Engineering design thinking, teaching, and learning, *Journal of Engineering Education*, Vol. 94, No. 1, pp. 103-120.

Duncan, A. K., & Breslin, M. A. (2009). Innovating health care delivery: The design of health services, *Journal of Business Strategy*, Vol. 30, No. 2, pp. 13-20.

Duncum, P. (1999). A case for an art education of everyday aesthetic experiences, *Studies in Art Education,* Vol. 40, No. 4, pp. 295-311.

Fixson, S. K., & Rao, J. (2014). Learning emergent strategies through design thinking, *Design Management Review,* Vol. 25, No. 1, pp. 46-53.

Gardner, H. (2007). *Five Minds for the Future.* Boston: Harvard Business School Press.

Gersi, A. (1997). *Reflections on Therapeutic Storymaking. The Use of Stories in Groups.* London: Jessica Kingsley Publishers.

Gibson, J. J. (1966). *The Senses Considered as Perceptual Systems.* Boston: Houghton Mifflin.

Glykofridi-Leotsini, A. (2006). *Aesthetic and art. Critic theories*. Athens: Symmetria.

Goldman, S., & Zielezinski, M. B. (2016). Teaching with design thinking: Developing new vision and approaches to twenty-first century learning. In A. Leonard & M. James (Eds.) *Connecting science and engineering education practices in meaningful ways: Building bridges*, pp. 237-262. Springer International Publishing.

Grammenos, N. (2015). Designers of the Future: introducing Creativity, Design and Design Thinking to primary school children. Paper presented at the *Art & Education: teaching and pedagogical approaches in the 21st century school conference*, Onassis Cultural Centre of the Onassis Foundation.

Grots, A. & Creuznacher, I. (2016). Design Thinking: Process or culture? A Method for Organizational Change. In W. Brenner & F. Uebernickel (Eds.), *Design Thinking for Innovation: Research and Practice, pp.* 183-191. Springer International Publishing.

Kala S. Retna (2016). Thinking about 'design thinking': a study of teacher experiences, *Asia Pacific Journal of Education*, Vol. 36, No. 1, pp. 5-19.

Ketikidou (2021). Design thinking in primary school (thesis), University of Macedonia.

Lave, J., & Wenger, E. (2005). *Situated learning: Legitimate peripheral participation* (Transl, E. Georgiadi). Athens: Savvalas.

Leverenz, C. S. (2014). Design thinking and the wicked problem of teaching writing, *Computers and Composition*, Vol. *33*, pp.1-12.

Lewis, T. (2005). Creativity: A Framework for the design problem-solving discourse in technology education, *Journal of Technology Education*, Vol. 17, No. 1, pp. 35-52.

Liamadis, G., Katsa, M., Korkoriadou, S., & Moustakas, K. (2020). Ways to sit. Using design as a tool children expand their experiential experience in the perception of space. In K. Tsoukala & D. Germanos (Eds.), *Children's Spatial Narrative*, pp. 181-193. Athens: Epikedro.

Lindberg, T., Meinel, C., & Wagner, R. (2011). Design thinking: A fruitful concept for it development? In H. Plattner, C. Meinel, & L. Leifer (Eds.), *Design thinking*, pp. 3-18.

Lioliopoulos, T. (2004). *The brain and child development. Neuroscience and the motor, emotional, social, and cognitive development of the child*. Thessaloniki: Technological Institution

Lor, R. (2017). Design thinking in education: A critical review of literature. Paper presented at the *Asian Conference on Education and Psychology*, pp. 37-68.

Magouliotis, A. (2002). *Visual creations I. Through observation: Ideas, thoughts, activity suggestions.* Athens: Kastanioti.

Maguire, M., & Delahunt, B. (2017). Doing a Thematic Analysis: A Practical, Step-by-Step Guide for Learning and Teaching Scholars, *All Ireland Journal of Higher Education*, Vol. 9, No. 3.

Manias, D., & Mavrommati, I. (2009). Creative narration as a design technique. Paper presented at the *6th Conference South-East Europe Design Automation, Computer Engineering, Computer Networks and Social Media.*

Martin, R. L. (2009). *The design of business: Why design thinking is the next competitive advantage*. Boston: Harvard Business Press.

McDonagh, D., & Thomas, J. (2010). Rethinking design thinking: Empathy supporting innovation, *Australasian Medical Journal*, Vol. 3, No. 8, pp. 458-464.

Mosely, G., Wright, N., & Wrigley, C. (2018). Facilitating design thinking: A comparison of design expertise, *Thinking Skills and Creativity*, Vol.27, pp. 177-189.

Nastou, M. (2023). Sustainable school and community. The role of school leadership. Paper presented at the *Panhellenic Association of Teachers for Environmental Education*, Vol. 19, No. 64.

Noweski, C., Scheer, A. Buttner, N., Thienen J., Erdmann, J., & Meinel, C. (2012). Towards a Paradigm Shift in Education Practice: Developing Twenty-First Century Skills with Design Thinking. In H. Plattner *et al.* (Eds.), *Design Thinking Research, Understanding Innovation*. Berlin Heidelberg: Springer Verlag.

Pallasmaa, J. (1997). Space place memory and imagination. The temporal dimension of existential space. In M. Treib (Eds.), *Spatial Recall Memory in Architecture and Landscape.* Routledge.

Pallasmaa, J. (1996). *The eyes of the skin.* Wiley.

Pandazis, P. (1997). *Pedagogy and play-objects in the kindergarten. A research approach.* Athens: Gutenberg.

Panke, S. (2019). Design Thinking in Education: Perspectives, Opportunities and Challenges, *Open Education Studies*, Vol. 1, pp. 281-306.

Papadopoulou, K. (2009). *The zone of closer development in the theory of L.S. Vygotsky.* Athens: Gutenberg.

Piaget, J. (1971). The Theory of Stages in Cognitive Development. In D. Green, M. P. Ford, & G. B. Flamer (Eds.), *Measurement and Piaget*, pp. 1-11. New York: McGraw-Hill.

Pink, D. H. (2006). *A Whole New Mind: Why Right-Brainers Will Rule the Future.* London: Penguin Group.

Popper, K. (1978). *Three Worlds. The Tanner Lecture on Human Values, Ann Arbor*. Michigan: The University of Michigan.

Pourkos, A. M. (2009). *Art, play, narrative. Psychological and psycho-pedagogical dimensions.* Athens: Topos.

Rauth, I., Koppen, E., Jobst, B., & Meinel, C. (2010). Design thinking: An educational model towards creative confidence. Paper presented at the *1st International Conference on Design Creativity*, pp.1-8, Kobe, Japan.

Razzouk, R., & Shute, V. (2012). What is design thinking and why is it important?, *Review of Educational Research*, Vol. 82, No. 3, pp. 330-348.

Saito, U. (2007). *Everyday Aesthetics*. New York: Oxford University Press.

Schirrmacher, R. (2002). *Art and creative development for young children.* New York: Delmar Thomson Learning.

Schirrmacher, R. (1995). *Art and creative development of children* (Eds, O. Kalouri-Antonopoulou) (Transl, G. Talin). Athens: ION.

Sharples, M., de Roock, R., Ferguson, R., Gaved, M., Herodotou, C., Koh, E., Kukulska-Hulme, A., Looi, C-K., McAndrew, P., Rienties, B., Weller, M., & Wong, L. H. (2016). Innovating Pedagogy 2016: Open University Innovation Report 5. Milton Keynes: The Open University.

Triliva, S. & Anagnostopoulou, T. (2008). *Experiential learning. A practical guide for teachers and psychologists.* Athens: Topos.

Tsiolis, G. (2014). *Methods and analytical techniques in qualitative social research.* Athens: Kritiki AE.

Tsourekis, D. (1987). *Modern Pedagogy*. Athens: Grigoris.

Tully, R. (2012). Narrative imagination: a design imperative, *Irish Journal of Academic Practice*, Vol. 1, No. 1.

Ulrich, L. T. (2015). Design: *The design of objects in modern society (Transl. S. Papadonopouloς).* Athens: Library of Law.

Von Thienen, J. P. A., Ford, C., & Meinel, C. (2016). The emergence of design thinking in Californian engineering classes: Four historic concepts worth knowing. Paper presented at the *MIC Conference 2016: From creative brains to creative societies*, Bologna: Italy.

Von Thienen, J., Meinel, C., & Nicolai, C. (2014). How design thinking tools help to solve wicked problems, *Design thinking research*, pp. 97-102.

Watson, A. D. (2015). Design Thinking for Life, *Art Education*, Vol. *68*, No. 3, pp. 12-18.

Weinert, C. (2003). Measuring social support: PRQ-2000. In O. Strickland & C. DiIorio (Eds.), *Measurement of nursing outcomes: Volume (3), self-care and coping*, pp. 161-172). New York: Springer.

Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity.* Cambridge: Cambridge University.