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The Dialogue Between Children and Digital Technologies – from the Experience of Reggio Emilia Preschools

KEYWORDS

preschool, Reggio Emilia approach, digital technologies, learning, child

ABSTRACT

In the context of different opinions about the use of digital technologies in preschools, this paper presents a techno-enthusiastic approach to the subject. It discusses the possibilities of incorporating digital media into preschool daily life. The paper provides the overview of Reggio Emilia (Italy) practice with digital technology, which is aimed mainly at supporting the children's learning process. The theoretical part is illustrated with visual documentation of the experience with digital media inspired by the Reggio Emilia approach.

An "alliance" with the digital world

As technology has developed within the last several decades, there is no doubt that children are immersed in digital culture from their earliest years. Contact with digital media has become a part of their everyday life, as digital media have achieved the same status as analog media that are strongly rooted in the experience of digital immigrants.[1] Already, at the beginning of our century, Marc Prensky noted that

[1] Marc Prensky distinguished between "digital natives" and "digital immigrants" according to how comfortable they feel with the digital culture.

> Today's students – K through college – represent the first generations to grow up with this new technology. They have spent their entire lives surrounded by and using computers, videogames, digital music players, video cams, cell phones, and all the other toys and tools of the digital age (Prensky 2001).

Therefore, the fact that digital technologies are so common in a child's life makes it impossible for an adult to ignore the digital world in which children are growing up. In the discussion on the use and meaning of digital technologies, two opposite opinions can be distinguished. On the one hand, we come across the "technophobic" approach which emphasizes the threats related to the popularization of technology, and, on the other hand, we encounter the "techno-enthusiastic" approach which ignores such threats and emphasizes new, previously unknown opportunities related to technology (see Bougsiaa, Kopciewicz 2016). The opinion presented in this article is closer to the latter approach, and, although we are aware of the threats related to the appearance of digital technologies in the experiences of a young child, in our work we mainly focus on the potential of new technologies and on their meaning in the children's learning process. The broad analysis of the literature of the subject, conducted by a team of researchers from the Adam Mickiewicz University in Poznań confirms the thesis that digital technologies may "exert a good influence on the cognitive development of children" (Klichowski et al. 2017). One of the key questions to be asked in the context of digital media is not whether but how we should organize educational experiences with the use of digital technologies. What educational situations should we create to use their potential to the greatest extent and to actually support the child's cognitive activity? According to the research carried out by Marzenna Nowicka, the introduction of technology and IT tools into the educational environment alone is not enough to change the didactic orientation. While analysing the early education lesson plans published on the Scholaris educational portal, Nowicka noted that

> the digital quality of the portal seems to consist in making the lessons attractive through the use of images and sounds, and making the teacher's work easier through technical solutions. Despite clear innovative tendencies reflected in suggesting e-experiences, the general model of education promoted on the portal is functional and behavioural. We can say that Scholaris suggests only a path towards constructivism, while it builds a highway towards the traditional, i.e. transmissional model. The promoted use of new technologies reinforces, or even "cements" frontal teaching, only it does so by a new, i.e. digital blackboard (Nowicka 2018: 46).

While reviewing the preschool lesson plans included in the portal, it is difficult not to see the analogies. The *blackboard digitality*, which is mainly reflected in displaying multimedia presentations to children, is also dominant in those lesson plans.

While we recognize the need to appreciate and include digital media into children's everyday experiences, we also see the necessity to learn about such educational solutions that do not treat digital technologies solely as a decoration, but, on the contrary, are a tool that truly supports the children's learning process. Examples of such an approach include the projects carried out in infant toddler centers and preschools in Reggio Emilia in Italy. The use of digital media in Reggio preschools is not instrumental and it is not aimed at the achievement of particular didactic objectives.[2] Its superior aim is to enrich the process of constructing knowledge. Thus, in our considerations, we focus on illustrating the learning process that involves the use of a digital language which is different from the traditionally perceived way of communication rather than on the analysis of particular multimedia educational programs or applications.[3] On the basis of the analysis of the projects conducted in Reggio Emilia, in the further part of this text we present the ways of supporting children's cognitive activity that are rooted in the constructivist orientation and based on digital technologies.

The educational approach in Reggio Emilia

Dorota Klus-Stańska (2018) distinguished three strategies of didactic thinking and three corresponding paradigms of didactics. Adopting them as a point of reference, the Reggio Emilia educational philosophy certainly fits into the interpretative-constructivist paradigm. Such a conclusion is based on the analysis of the assumptions (not always even conscious) of the approach, ones concerning the nature of cognition and reality, including particular images of a child and interpretations of their learning process. Carlina Rinaldi (2007: 117) notes that "Many different images could be possible: highlighting what the child *is* and *has*, *can be* or *can do*, or on the contrary emphasizing what the child is *not* and does *not have*, what he or she *cannot* be or *do*." The Reggio Emilia approach, shaped, inter alia, by the idea of social constructionism, "is an educational philosophy based on the image of a child with strong potentialities for development and a subject with rights, who learns through the hundred languages belonging to all human beings, and grows in relations with others." (*The Reggio Emilia Approach*…). A child is perceived as a person who is competent, full of potential, and able to communicate with others, while learning is understood as "a true act of co-construction" (Rinaldi 2006: 125). A child constructs their knowledge in a relation

[2] The use of digital technologies in early education is reflected mainly in working with various multimedia programs aimed at mastering particular skills, e.g. mathematical skills (counting, adding, and subtracting), basic skills related to reading and writing, and improvement of observation skills, logical thinking, and memory (see Walter 2012).

[3] See the review of various programs and applications in the publication by Klichowski et al. 2014.

with others, a knowledge which is metaphorically described by Loris Malaguzzi as a "tangle of spaghetti" (Dahlberg, Moss 2006: 7), which seems to be non-linear, and which lacks universality and hierarchy. Such an understanding corresponds with the interpretation of knowledge in connectivism, which is typical of the culture of the digital age, where knowledge is characterised by the content structure, and it is created in the mind with the primacy of developing independent strategies of thinking (Klus-Stańska 2018: 115). However, we have to emphasize that although that process is individual, it always takes place in the context of social interactions. As a social being, a child "[...] is born with all the languages of life" (Malaguzzi 2006: 30) and, in the process of learning, they can use many more languages than the verbal language dominating in education.

The metaphor of the *hundred languages of children*

The poem by Malaguzzi: "The Hundred Languages of Children" has become one of the symbols of the Reggio Emilia approach. In that approach, however, a language is defined in a much broader scope than the verbal language. In Reggio, languages are interpreted as "the different ways used by human beings to express themselves; visual language, mathematical language, scientific language, etc." (Vecchi 2010: 9). Number "hundred" is symbolic itself. On the one hand, it means multitude and diversity of languages; on the other hand, it emphasizes an equal status of each of them. According to C. Rinaldi,

> […] the hundred languages is not only a metaphora for crediting children and adults with a hundred, a thousand creative and communicative potentials. In our opinion the hundred languages represents a strategy for the construction of concepts and the consolidation of understanding. But above all it is a declaration of the equal dignity and importance of *all* languages, not only writing, reading and counting, which has become more and more obviously necessary for the construction of knowledge (Rinaldi 2006: 175).

Thus, a 'rich' and competent child has an unlimited resources of ways of communicating and expressing their own interpretations of reality. To do this, they use various media and symbolic systems (Vecchi 2010: 9), because each of the languages "has its own grammar, its own specific nature, but it also has a structure disposed towards communication and relation" (Vecchi 2010: 18). Therefore, an important task of teachers is to notice the opportunity to use those languages in the children's learning process, to introduce children to the world of those languages, and to enable children to learn the alphabet of each of them. Each medium available to children

is a separate language (Forman 1994) with its own alphabet, which not only refers to the properties of a given material (colour, texture, shape), but also to the way in which each medium can be used (see Maj 2017). In the interview with Lella Gandini, Giovanni Piazza explains that:

> An alphabet is probably best described as the combination of the characteristics of a particular material along with the relationship that arises in the interaction between the child and the material. It is during the construction of that relationship that the possibilities of modification, transformation and structuring of the material present themselves, so that the transformed material can become a conduit for expression that communicates the child's thoughts and feelings (Gandini 2005: 13).

Children's thinking is interdisciplinary because children use various languages which are complementary. Each language has a different potential of expression and allows one to explore a given topic in a deeper and more thorough manner. Since the range of languages that can be used is not a closed catalogue, it is worth being ready and open to include previously unknown languages that provide children with the opportunity to gain new experience, to look at a problem from a different perspective, and to notice the aspects that had not been possible to discern before. Such an openness was certainly shown by the educators from Reggio, with Loris Malaguzzi in the lead, who introduced new technologies to their educational project already in the 1980s. As a result of introducing computers, printers, scanners or digital cameras into preschools, new contexts occurred and a new tool for exploration and expression appeared: a digital language. The development of digital technologies had a great influence on changes in learning, communicating, and constructing knowledge as well as in the identity of children attending the Reggio Emilia preschools (Baldini et al. 2012: 225).

The introduction of modern technologies into Reggio Emilia early education institutions

For Loris Malaguzzi, the leader of the Reggio Emilia Approach, the cultural context in which early education institutions function was always very important. Paola Cagliari remembers that Malaguzzi, who was always attentive towards phenomena in contemporary life, decided that preschools could not remain indifferent towards the first appearance of personal computers in offices and homes (Cagliari 2019: 10). Along with the appearance of the first personal computers, Malaguzzi noticed the potential of new technologies, which is confirmed by the below question he posed in 1985 in the context of using computers in the education of a young child:

> If our eyes, although they can see, could see more and better? And were more curious, more avid, more capable of exploring? More skilled at complicating networks of measure and relations, to the point of "seeing" new ones? More capable of including fiction in reality and vice-versa?... in an attempt to help children equip themselves with as many new strengths as possible for the acquisition of their wholeness and as many qualities as possible for learning to enjoy and defend it (Baldini et al. 2012: 160).

Malaguzzi's openness and readiness to face educational challenges related to new technologies are confirmed by the conference organised in 1985,[4] during which early education teachers from Reggio Emilia shared their experiences and related teaching theories on the use of various media. One of the sessions entitled "Approaches for the future: Children's intelligence, computer intelligence" (*Approci per il futuro. L'intelligenza dei bambini, l'intelligenza del computer*) was dedicated to children's encounter with a new tool, i.e. a computer. While experimenting with computers, children made precious remarks on the new tool: "It's intelligent, but only a bit. It gets its intelligence from us." (Cagliari 2019: 11), they commented. Also, they noticed the need to build a relation and find the common language with the computer: "The computer obeys us, but if I don't write things the way it wants, what happens is it doesn't give you the answer" (Moss 2016: 286). Those first experiences confirmed Malaguzzi's belief in the children's potential and their readiness to build a relationship with more technologically advanced tools. Cagliari summarizes that period as follows:

> […] digital technology gradually became integrated into children's living spaces and learning contexts, heightening their senses and perceptions, offering new tools with which to investigate, and giving new potential to the expressive and aesthetic qualities of representations and narratives children use to give form to knowledge (Cagliari 2019: 10).

New technologies – new language – new learning environment

A natural consequence of digital technologies that appeared in a preschool (e.g. computers, scanners, projectors, digital cameras, microscopes) was the emergence of another language that provided children and teachers with new opportunities. Here is how Giovanni Piazza, an *atelierista*, described the potential of that language:

[4] In a four-day conference entitled *Esperienze* a problem: *Modelli e congetture teorico-pratiche nell'educazione dei Balbini (Experiences and Problems: Theoretical-practical Models and Conjectures in the Education of Children)*, more than 400 participants took part, not only from Italy, but also from Sweden, Germany, Denmark, Switzerland, Luxembourg, Germany, and Spain (Baldini et al. 2012, Moss 2016).

> The arrival of digital technology has generated new forms of language that enable children to structure knowledge and relationships in ways that frequently expose the imaginative limitations of adults. It offers opportunities to participate in images, to get inside them on a micro and macro scale, to shift points of view and see different images at the same time, to experience imaginary realities, immerse ourselves in light effects that cannot be found in nature, and transform sounds during their production (Piazza 2007: 119).

However, what is a digital language (a digital medium)? From the technical point of view, according to the definition of George Forman (2012: 343), a digital medium is any type of a file recorded on a computer, even if it is later printed or recorded on a carrier, nevertheless, in the interpretation of Reggio educators the meaning of a medium is much deeper. They perceive digitalization not only as the dematerialization of the reality and recording it in the form of bits. They believe that digitality "a something that multiplies levels of materiality, a builder of artefacts transiting between analogical and digital, and vice-versa" (Bonilauri, Tedeschi 2019: 14). In that approach, a balance between the real and the digital world is kept, which is very important. The digital language cannot function as an alternative to traditional "analog" media, nor can it replace or dominate them. The basic principle concerning the use of various languages is their synergy. According to Forman, each medium, e.g. paints, pencils, clay, computer graphics, or a digital video, when used to present one's interpretation "possesses a range of referents that medium can easily and clearly express, at least relative to other media" (Forman 2012: 350). What is important is to notice those opportunities for action that other media do not have, and to use the medium's unique potential in the process of constructing knowledge.

Due to the fact that a new language was developed in the Reggio Emilia institutions, an educational space of a new quality appeared. The organization of the surroundings is a very important aspect in the Reggio Emilia approach. The environment is not just the background of a child's activity, its role does not boil down to logistic issues. The educational space creates new contexts for experimenting, asking questions or making hypotheses: "organising the spaces of a school means organising a metaphor for knowledge, giving centrality to learners" (Bonilauri, Tedeschi 2019: 14). Digitality which penetrates the educational space creates such new contexts, providing children with new ways of representing their thoughts or theories. According to Vecchi:

> The digital environment, by which I mean the synergy and relationship between different tools such as computers, scanners, digital cameras, recorders and projectors has increasingly entered schools as an everyday working environment and we have made considerable advance in its use at theoretical levels together with some interesting and innovative experimental applications with children (Vecchi 2010:166).

Thus, a new didactic model was developed in Reggio Emilia preschools, one in which the child's work with new technologies became an integral part of their everyday cognitive activity. The model was created in a kind of opposition to the model in which working with a computer or a tablet occurs individually, in a special, isolated room (e.g. a computer room), and which focuses only on technical aspects of using the equipment and software, ignoring and "separating technology from a sense of humanity" (Baldini et al. 2012: 225). That aspect is clearly emphasized by Cagliari:

> Between schools which tend to confine computers in special labs, and predominantly teach IT techniques, separating technology from a sense of humanity, and other after-school activities which offer technology's gaming and relational dimensions, we must think of places for creative, constructive, meta-cognitive reflection on the potentials of these tools. We must let children discover that what we have with digital tools is a *dialogue*, in which it is necessary for the intelligence of human beings to meet the intelligence of devices (Cagliari 2019: 13).

Actually, the children themselves noticed the need to build a specific dialogue with a computer, which is confirmed by the exchange of opinions between the children from the Diana preschool: "The computer is like a foreigner, and if you want to talk to it, you have to speak its language". "Yes, but computer has to understand how we talk, too, and it has to do what we want it to do" (Forman 2012: 346). As has been observed by Forman, it is due to that deep relation that the products made with the use of new media "are so incredibly inventive, nuanced, and varied" (Forman 2012: 346). While working with new technologies, the need to build relations is not limited to the child-tool system. First of all, working with a computer is a context for working in small groups of 2 or 3; it is a tool in the process of constructing and negotiating meanings also with peers and adults. It supports the creation of children's representations of reality and facilitates communication. A computer, along with additional devices and software, is not just a part of the classroom equipment, but it is treated as „a connector of areas of knowledge and muti-disciplinary explorations" (Cagliari 2019: 14).

The potential of a digital language

There is no doubt that digital technologies are attractive. The digital world is fascinating to children; it draws their attention and influences them very strongly. Thus, there is a risk that digital media may come to dominate all other media. However, the Reggio Emilia approach calls for keeping a balance and a relationship between various languages, as each of them provides the children with different opportunities of exploration. From that perspective, a teacher's key task is to notice those properties

of digital media that make them different from other media and that provide the opportunity to capture a given problem from a different point of view. What is certainly typical of digital media and what makes them stand out is their flexibility and ease of modification. The digital format gives children the opportunity to create and transform their works. Cagliari explains that, "In practice, digital tools are offered to children as a powerful means of interacting with experience and ideas, and giving them form: they multiply, animate and transform children's drawing, painting and sculpture work, and their verbal and physical narratives" (Cagliari 2019: 12). The use of various tools facilitates an integrated, hybrid way of thinking. Due to the application of digital media, the children's narratives are more complex, multithreaded, and richer in details. The digital media provide the children's cognition with a macro level[5], which has been unavailable before, and new relations with well-known objects; they encourage children to change their point of view, get children involved in creative activity, and inspire them to create new, unreal worlds.[6] In the context of constructing knowledge, Simona Bonilauri and Maddalena Tedeschi (2019: 13) enumerated several aspects of a digital language that facilitates learning. They include:

- interdisciplinarity and synergy among the languages: children may solve a problem not only from the perspective of one scientific discipline;
- reversibility: it enables one to make simulations, verify hypotheses, and correct mistakes in thinking;
- documenting the learning process: it gives children the opportunity to trace and observe their own process of learning, to identify and understand their own strategies of learning;
- unlimited possibilities of transformation: no barriers for the fulfilment of children's creative ideas;
- the ease of communication and the ability to create the communities learning without territorial limitations: a digital language supports the creation of communication networks.

[5] E.g. through the use of pen microscope.

[6] Vea Vecchi, an *atelierista* also recognizes the potential of digital media. However, at the same time, she warns against the excess of sensations and stimuli offered by the media, as they may dominate and obscure children's representations and ideas (Vecchi 2010: 115).

A review of the ways of using digital tools in working with children[7]

In the constructivist paradigm, one which the Reggio Emilia approach is a part of, planning children's activities involves a completely different logic than the approach dominating in Polish education, which is focused on creating detailed lesson plans with precise educational goals and without flexibility. In the Reggio preschools, a curriculum is emergent. Since the curriculum is realized in the form of projects, it emerges day-to-day as a response to children's needs, ideas and interests. A teacher's task is to organize a situation which inspires children's cognitive activity, with being aware that it is just a kind of a hypothesis. That is because it is impossible to plan the child's learning process in details. And, although below we are presenting a closed list of some suggestions for using digital technologies in working with young children, they should not be implemented into one's pedagogical practice without further consideration. As we have already mentioned, the introduction of digital technologies into an early education institution will not change its culture on its own. Thus, it has to be considered in which didactic model particular ideas should be realized, and such an awareness of one's didactic approach is what we are calling for. The suggestions presented below are to be treated as examples of experiences that stimulate children's learning process, and not only as its result.

Digital photography

Tools: a digital camera, a pen microscope.

Taking photos makes it possible for children to create various representations of the same object. It enables capturing the child's subjective point of view and shows the aspects of the explored reality that are interesting to a child. Through photography, children develop their sensitivity to the environment in which they function (Vecchi 2010). Not only taking photos make it possible to capture the images children see, but they can also bring back the atmosphere and emotions. A photo taken by a child is not only a record of their observations, but also a stimulus for the revision of their experiences at further stages of their work (photo 1).

[7] Digital technologies also play a very important role in a teacher's work, especially in the creation of pedagogical documentation, which is one of the foundations of the Reggio Emilia approach.

Photo 1. A digital camera as a tool for exploring the surroundings

Source: the private collection of J. L.

Photos taken by children allow them to understand the adopted perspective and provide children with an opportunity to see their experiences from a distance. A photo encourages one to interpret the image through referring a virtual world to the real world, and inspires one to consider the relation between the cognized reality and the cognizing person (Forman 2012). Digital photos can easily be imported into a computer or other tools, and then they can be displayed, modified and transformed. A particular kind of photos can be taken with a digital microscope, as they enrich children's experience with the macro dimension which is inaccessible with the use of other devices (photo 2).

Photo 2. Ordinary objects in unusual macro scales

Source: the private collection of J. L.

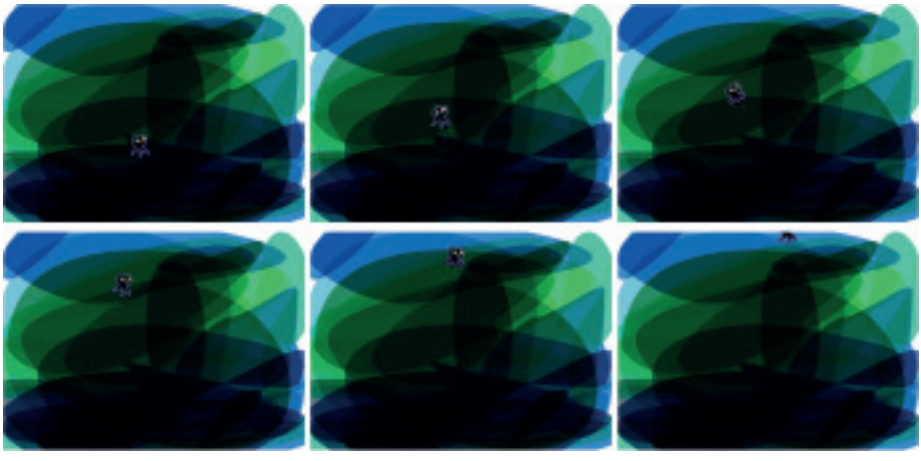
Creating films and animations

Tools: a digital camera, a video camera, a webcam, a digital microscope, a computer equipped with software for capturing and recording videos, software for editing video files, stop motion software.

Compared to the opportunities provided by digital photography, the language of animation enriches children's experiences with new aspects. It makes it possible for children to experiment with time, movement, and space, and it enables one to

capture the dynamics of the phenomena observed by children. While creating an animation, a child transforms the reality by constructing it, in a way, anew. That is why, a child has an opportunity to understand how the reality works and how complex it is. The use of a video pushes a child towards a new process of prefiguration, increases the scope of possible relations, and creates new relations which could never occur in nature (Menino 2019) (photo 3).

Photo 3. Subsequent frames of an animation based on a child's digital illustration



Source: the private collection of J. L.

Creating a digital space – projection of images

Tools: a digital camera/computer, projector.

The creation of a digital space is the strategy of immersing the child's real world in the virtual world. The combination of those worlds which seem impossible to combine enables children to create new meanings. Photos and films, including those made by children, are displayed on walls, floors, and ceilings, crossing, so to speak, real, architectonically defined boundaries. Images can also be projected onto various objects and surfaces. The displayed images create a new deconstructed reality in which a child may function, and which they can explore anew (Menino 2019: 106). Such projections are interactive. They initiate situations in which the real world is mixed with an illusion. A child becomes an active recipient; they can enter into an image and become a part of it (photo 4).

Photo 4. Blending into the space of a digital image

Source: the private collection of J. L.

Digital drawing

Tool: a graphic tablet.

Drawing with the use of a graphic tablet makes it possible for children to make an infinite number of corrections and modifications.[8] While making several versions of the same work, a child learns how to make decisions, compare, and observe relationship between a selected tool and the nature of the artistic expression. Working with a graphic tablet enables non-standard combinations of artistic techniques (e. g. watercolour and oil paints) and painting using techniques which are not recommended in a young child's art education.

Scenography sets and microstructures

Tools: laptops, webcams, multimedia projectors, digital microscopes.

The combination of technological functions of tools (playing, modifying or enlarging images) with various material objects creates a specific scenography set for children's activity. Possible worlds, full of multidimensional and interdisciplinary images, become a new reality for children, who can explore and discover new things. According to Bonilauri and Tedeschi:

[8] Examples of modifications include changing colours, using filters, removing objects; in vector graphics software: scaling, moving elements in various directions, filling objects with colours and gradients, using transparency of elements.

> A possible world is a space of sensory, narrative, and evocative amplification laid down in a digital image. Possible worlds present things that would otherwise be invisible to our eyes, which is why they stimulate children to think in complex systemic ways (Bonilauri and Tedeschi 2019: 15-16).

The ultimate effect of the actions often includes the arrangement of space verging on the art of stage design, *site specific*, and *video art* installations. A number of various presentation forms makes a child's experience fuller, deeper, and multisensory.

Multimedia archive

In each of the educational institutions, a digital archive is created in which teachers store catalogued photos, films, and scanned works of children, which can be modified at further stages of the project (photo 5). The archive is a kind of a database which is not only used for organising educational situations, but also for preparing pedagogical documentation.

Photo 5. A scan of a child's drawing and its computer modifications

Source: the private collection of J. L.

In the next part of the article, we present examples of digital experiences that can be initiated in preschool. However, while reading the narrative below, it is worth noting that learning about the world through digital technologies can never replace a direct experience, i.e. a real contact with the explored world.

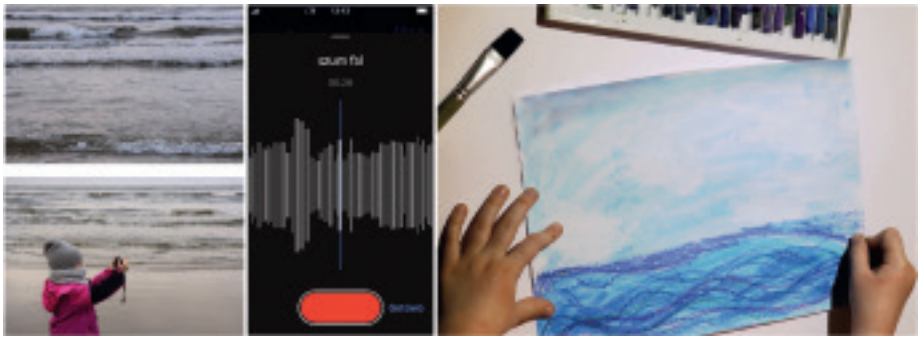
Experimenting with digital technologies – an activity inspired by the Reggio Emilia approach[9]

The activities described below are a simulation that has been conducted and documented for the purpose of illustrating this article. Their purpose was to attempt to show the essence of the processual nature of teaching applied in Reggio Emilia. In Reggio Emilia projects, the starting point always includes direct experiences; one often starts from watching nature and the closest surroundings. Such topics, which seem to be "ordinary" pieces of the reality in which a child is functioning, make it possible to awaken the child's cognitive curiosity freely and naturally and take long-term actions or actions requiring time intervals. The described situations were arranged with the participation of a girl aged 6.5. The starting point and the main inspiration was the observations of sea waves. The aspects that aroused the child's curiosity included visual features of waves, such as: movement (direction and rhythm), the colour of water (seen from close up and from a distance) and the sound (wave roar, sounds made by seagulls), as well as the weight, force, and smell carried by the wind.

The girl documented all the observations using a digital camera (photos and videos) and a tape recorder. She illustrated her observations in the form of a drawing made using oil pastels and water-colours (photo 6).

[9] Extremely valuable examples of experimenting with digital technologies in the Reggio Emilia spirit in Poland include the projects carried out in the Preschools of the University of Gdańsk (see the profile of the preschool: facebook.com/Przedszkole Uniwersyteckie UG) or the Sto Światów (Hundred Worlds) Preschool in Warsaw (see faceook.com/Sto Światów Dziecka), as well as the experiences of Agnieszka Kuźba in the Preschool in Piekoszowo (see facebook.com/ Reggio Emilia Polish projects and inspirations).

Photo 6. Active observation of the sea (photo, video and audio documentation) and artistic expression inspired by the observation



Source: the private collection of J. L.

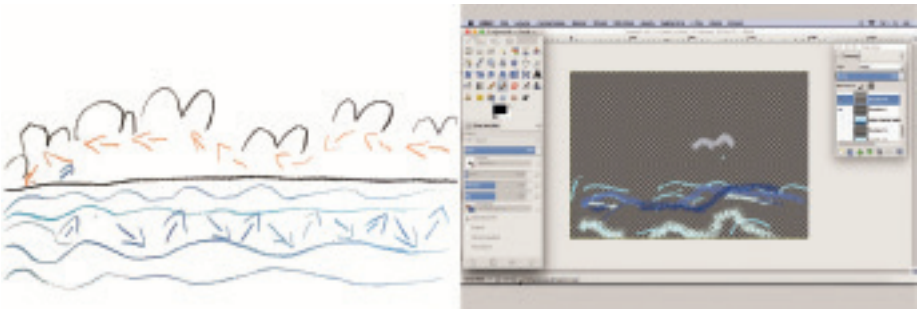
The idea of creating an animation on the basis of the girl's work resulted in another action: the projection of the recorded video fragments to analyse the direction of the waves and the seagull's flight (photo 7).

Photo 7. The projection of a video recording and playing a seagull's flight

Source: the private collection of J. L.

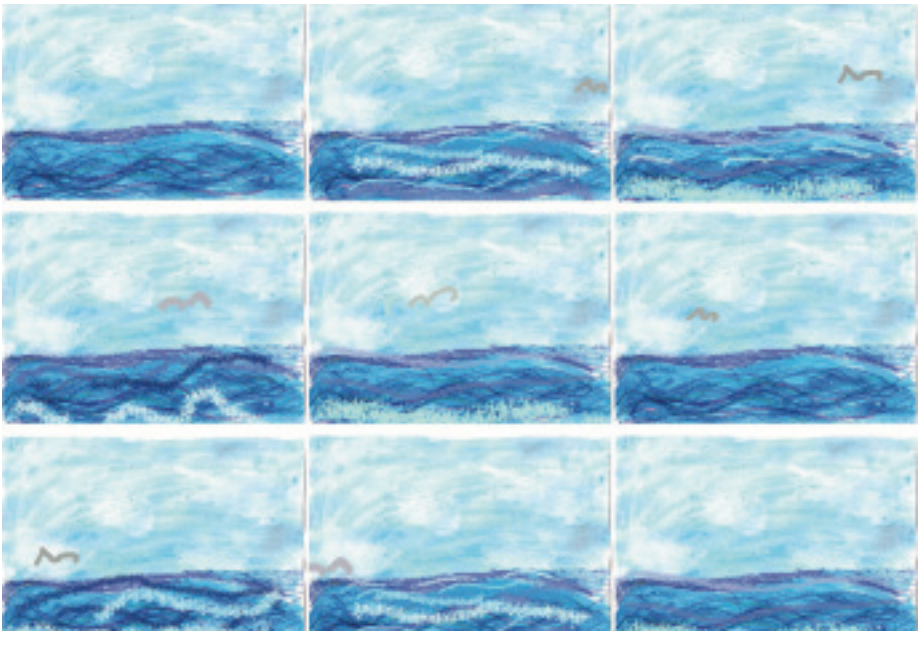
They were followed by a hand-made, schematic storyboard for the planned stop motion animation. A scan of the above-mentioned illustration was used as a background of the animation; it was edited in the Gimp graphic program. On several layers of the file, the child made her own drawings that made subsequent frames of the animation. Finally, the wave roar recorded by the girl was added to the animation (photo 8, photo 9).

Photo 8. Working on the animation: storyboard and working on layers in GIMP



Source: the private collection of J. L.

Photo 9. Subsequent frames of the animation



Source: the private collection of J. L.

The final stage of the simulation is certainly satisfactory both for the child and for the adult supporting the child, as the adult is able to watch the child's involvement in the activity they took up. However, what is the most valuable in terms of cognition is the path based on experiencing and creating. Its starting point is the direct observation of the reality, and, due to the use of digital media, the child is able to notice the aspects that are impossible to observe through analog devices.

Conclusion

It is difficult to deny that digital technologies are present in the lives of children. However, their introduction into early education institutions cannot resemble a fun-fair attraction which is cheap, childish, devoid of an aesthetic dimension, and absorbing children's attention in an aggressive manner. Digital technologies generate many stimuli and it is hard to resist them; sometimes they make children's senses numb. Their presence in children's everyday experiences is justified only when it intensifies the children's experience by enabling a multi-level recording of the perceived phenomena; only if it presents a new perspective of the reality explored by a child. Thus, digital technologies should certainly be tamed, by providing children with the opportunity to build a relationship with the digital world which will, most of all, expand their cognitive activity.

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