1

VOICES FROM THE CLASSROOM

Vana Chiou, Lotte Geunis, Oliver Holz,
Nesrin Oruç Ertürk, Fiona Shelton (Eds.)

VOICES FROM THE CLASSROOM:

A CELEBRATION OF LEARNING

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edited by
Vana Chiou, Lotte Geunis, Oliver Holz,
Nesrin Oruç Ertürk, Fiona Shelton

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Steinfurter Straße 555, 48159 Münster, Germany

www.waxmann.com
info@waxmann.com

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Contents

Preface

Experiences of education can be understood through the plurality of intergenerational, interprofessional and intercultural voices, voices from students, educators, school personnel, parents, stakeholders, and policy makers. Voices speaking the same or different languages, narrating interesting stories about school life and educational experiences in various cultural contexts; voices talking about commonalities, exceptionalities, needs, interests and perspectives in current education.

Voices from the classroom are heard, analysed and discussed from a position of expertise, reflecting views, attitudes, beliefs, suggestions and proposals. They serve as a useful "tool" for educational research providing information and data derived from authentic school environments.

This publication on "*Voices from the Classroom: A Celebration of Learning*" brings together voices from eight different European countries; Austria, Belgium, Croatia, Germany, Greece, Poland, Turkey and United Kingdom. It includes a collection of 38 contributions from researchers, professionals and practitioners specialising in the education sector. The authors adopt various methods, techniques and research tools, to investigate a broad range of topics such as diversity, contemporary didactics and pedagogy, ICT and social media in education, life-long learning, future education, intercultural education, communication, creativity, and sustainable development.

The contributions underwent a blind-double peer review and proofreading as a prerequisite process for their inclusion in this publication; however, individual authors are responsible for the overall integrity of their work, including its originality, accuracy and verifiability.

This publication intends to guide educators, future teachers, researchers and practitioners across the broad realms of education.

We hope you will hear the *Voices from Classroom* with interest!

Vana CHIOU (Greece)
Lotte GEUNIS (Belgium)
Oliver HOLZ (Belgium)
Nesrin ORUÇ ERTÜRK (Turkey)
Fiona SHELTON (United Kingdom)

Maria Aleksandrovich & Jacek Kowalczyk

Development of Artistic Ability: Fine Motor Skills and Plasticine

Artistic activities (in this case referring to drawing and modelling in plasticine) is one of the first and most easily accessible forms of play, which enables children to express themselves, to reflect their imagination and the world through their eyes, to express their thoughts and their emotional-volitional sphere. Artistic activities have a particular influence on the development of children's perception and thinking, teaching them to look and to conduct conscious observation (Muchina, 1981). They also enable children to communicate the object world, initially in their own way and, with time, in accordance with generally accepted norms.

The aim of the article is to present issues connected with the development of fine motor skills from the neuropsychological perspective, to trace (based on source literature) how and when children develop an interest in modelling, and to explain (based on the authors' observations and practice), the stages of normative development of modelling.
Keywords: *fine motor skills, brain development, development of artistic skills, stages of normative development of modelling*

1 Introduction

Play accompanies children from the first days of their lives. It is not simply a means of dealing with boredom – it also allows children to develop numerous skills and habits which support the development of fine motor skills, memory, imagination and abstract thinking Artistic activities (in this case referring to drawing and modelling in plasticine) is one of the first and most easily accessible forms of play, which enables children to express themselves, to reflect their imagination and the world through their eyes, to express their thoughts and their emotional-volitional sphere. According to Muchina (1981), artistic activities have a particular influence on the development of children's perception and thinking, teaching them to look and to conduct conscious observation. They allow children to communicate the object world, initially in their own way and, with time, in accordance with generally accepted norms.

Wygotski states that: "*In speaking of play and its role in the pre-schooler's development, we are concerned with two fundamental questions: first, how play itself arises in development – its origin and genesis; second, the role of this developmental activity, which we call play, as a form of development in the child of preschool age*." (Wygotski, 1966, p. 62).

The aim of the article is to present issues connected with the development of fine motor skills from the neuropsychological perspective, to trace (based on source literature) how and when children develop an interest in modelling, and to explain (based on the authors' observations and practice), the stages of normative development of modelling.

There are numerous types of play which can be used in the development habits, artistic and fine motor skills, while supporting the holistic development of children.

When choosing a form of play we need to make certain that it is adequate for the children's age, and that all tools and materials used in it are suited to their abilities and, most importantly, safe. That is why a major part in sparking an interest in artistic play in children is played by adults, who are responsible for creating the necessary environment for this to take place, and who actively influence the process of forming artistic abilities in children.

2 The Development of Fine Motor Skills in Pre-School and School Age

Fine motor skills are manifested in all movements of fingers and hands, which require a great deal of attention. Fine motor skills include such activities as drawing, painting, writing, building with Lego blocks, forming and modelling plasticine. Development and improvement of fine motor skills is a sine qua non condition of proper human development. The process of shaping and perfecting fine motor skills should take place at the earliest possible stage, while artistic activity is a necessary part of free play in children from an early age.

Fine motor skills can be *shaped in two ways*: through free movement and through play, which was arranged and crated for this purpose. Muscle development from arms to fingers gives children the strength required to manipulate. Developed strength and control of hands and fingers facilitate the beginnings of the pincer grasp, which is useful for grabbing pencils and pens. Fine motor skills *develop in stages*. Everything begins with grabbing toys, then arranging building blocks, holding cutlery, colouring, and at the final stage, children learn to write and tie their shoe-laces. In the course of development, children improve their motor skills. As they develop their fine motor skills, they become more independent, which is illustrated by their self-sufficiency in terms of feeding. Complete mastery of fine motor skills is a problem for small children because these activities include both hands and activate both hemispheres (Payne & Isaacs, 2016). By providing access to materials and artistic tools and by indicating various ways of using them, we allow children to develop fine motor skills, creativity and imagination. Artistic activities begin around the age of 3. The development of perception processes and manual skills allows children to improve their drawing. Drawing becomes rich in content, colour, and their form assumes more realistic shapes, reflecting the world of children's subjective experience.

The human brain can change its organisation and functions in response to experience at any given age. We call this phenomenon plasticity. During the first two years of life, the brain displays the highest degree of plasticity. The brain of a five-month-old child attains 90% of its adult weight (Dubois et al., 2013). Children's brains have a tendency to accelerated growth, with periods of rapid growth followed by slight growth or decreased rate of growth, accompanied by synaptic pruning (Gogtay & Thompson, 2010). Seldom used synapses are pruned in response to increased life experience. It is an important part of neurological development, which leads to more effective thinking. The corpus callosum, which connects the brain hemispheres, enables their communication and processing coordination (Banich & Heller, 1998). In early childhood the cor-

pus callosum grows and undergoes myelination, which allows the two sides of the brain to communicate in a more refined way and to work effectively in an integrated manner. As a result, children are capable of executing big and small movements, such as grabbing and throwing a ball or tying shoe-laces. Moreover, myelination leads to many changes, which we can observe in children's abilities. Myelination refers to a process in which glial cells create and cover axons with myelin, which accelerates the transmission of neural impulses (Markant & Thomas, 2013). It is due to myelination that children's thinking and behaviour become more coordinated and complex. Rapid myelination occurs between birth and four years of age in the somatosensory and motor cortices. The process itself lasts throughout childhood until maturation and early adulthood.

Fine motor skills are controlled by areas of the frontal lobe, which include the primary motor cortex and the supplementary motor area. The primary motor cortex is located in the precentral gyrus and is often visualised as a motor homunculus. Areas of the body, such as hands, which enable the execution of more complex movements, have a greater representation on the motor homunculus. Thanks to this area of the brain, unlike all other species, we have opposable thumbs, which allow us to perform incredibly precise movements and to operate tools, as well as to store information concerning the spatial aspects of movement (Schott, 1993; Scott & Kalaska, 1995).

The supplementary motor area, which is located just in front of the primary motor cortex, is responsible for the stability and regulation of posture, as well as motion sequence coordination. The prefrontal cortex, located just below the supplementary motor area, integrates sensory information from the posterior parietal cortex, takes part in the planned sensory movement, and initiates the programming of movement. Kasses et al. (2008) claim that the supplementary motor area plays an important function in the context of imagining movement by sending information to the primary motor cortex to withhold physical movement.

Another important area of the brain in the scope of shaping fine motor skills is the cerebellum, which also allows controlling balance. It is especially important for regulating complex activities, such as writing (Planton et al., 2013). It is especially important for coding information concerning the temporal alignment of motion sequences (Ivry & Keele, 1989). Although women have better motor skills the cerebellum in men is larger, even given the fact that men's brains are naturally larger (Raz et al., 2012). The next element worth mentioning is the basal ganglia. It is the area of the brain in which we can observe sex differences in brain physiology. Basal ganglia are a group of nuclei in the brain that assume various functions, some of which include movement. The globus pallidus and the putamen are two nuclei of the basal ganglia which are involved in motor skills. The former takes are connected with voluntary motor movement while the latter is tied to learning motor skills. Both elements are bigger in men than in women (Rijpkema et al., 2012).

Neural networks are important from the point of view of improving fine motor skills. Neural networks, which include the parietal cortex, the motor cortex and the cerebellum, correct the mistakes made during previous movements, whereas those areas connected with the basal cortex and ganglia correct current movements. These and

other networks acquire and create movement sequences through explicit and implicit learning (Wise & Willingham, 2009).

Progress in brain development in school-age children enables them to build complicated and very small models of cars, learn to play musical instruments – they perform tasks dependent on fine motor skills. The development of fine motor skills is especially important in the context of educational achievements and correct writing. Most children at the age of 6 can write the letters of the alphabet. Capital letters are usually mastered first, whereas lower case letters require more precise movements of the hand, which is achieved through practice. In third grade, most children can write in italics. Girls are superior to boys in the scope of fine motor skills (Junaid & Fellowes, 2006). Success in terms of motor skills, especially writing, can influence later academic achievements. During school years, children become proficient in using pencils to draw and write words and sentences. They are able to control their hands independently, which makes it possible for them to play musical instruments. Many children display interest in activities that require precise coordination of movements, such as drawing, assembling car models and sewing. At the age of 12 their fine motor skills are comparable to those of adults.

With time children develop preferences in the scope of operating their left or right hand. Later activity connected with the preferred hand reinforces it and the neural connections and improves its dexterity, as a result of which one hemisphere becomes dominant. Despite lateralisation the two hemispheres cooperate in various ways, allowing us to think, move, create and exercise our senses.

Creativity requires abilities connected with processes on the area of the frontal lobe, such as working memory and constant attention (Fink et al., 2007). Limb and Braun (2008) discovered that during improvisation, the brain displays a general deactivation in the lateral prefrontal cortex, which is usually connected with self-regulation, self-control, focus and inhibition. Turning off this area of the brain may be connected with a type of unfocused attention, which allows for spontaneous unplanned associations and sudden realisations. They also noticed increased activity in the medial prefrontal cortex connected with self-expression and individuality. Chavez-Eakle et al. (2007) state that creative and artistic thinking is also tied to specific neural networks because of increased activity in areas of the brain involved in cognitive functions, emotions, working memory and reaction to novelty. Advancements in research on creativity resulted in the conclusion that activities connected with creative thinking result in diversified patterns of activity in many regions of the brain (Fink et al., 2007).

3 Development of Interest in Modelling in Plasticine

Modelling is the act of forming something or combining into a whole elements of plastic material (plasticine, clay or other material) using hands or tools. Modelling is one of the basic techniques of a wide range of decorative and applied sculptures. For children it is the most 'tangible' form of art, for they can not only see what they create but also touch their own work, start paying with the figurine at once and easily modify it if

they need to. When moulding plasticine children usually use both hands and the level of modelling depends on the manual skills of their hands and fingers, not on the ability to use crayons, brushes or scissors. From this point of view modelling is one of the most accessible means of artistic expression for children.

Classes in modelling, similarly to play, foster the development of visual perception, memory, visual thinking, a sense of aesthetics and beauty. Playing with plasticine develops those aspects of fine motor skills which are essential for school achievement. Moulding, to a greater degree than drawing or decorating, allows children to master basic mathematical problems (more, less, the same amount), teaches spatial orientation (left, right, up, down, imagining what one's work looks like from all sides – even those that are unseen), develops a sense of plasticity, form and weight, teaches planning and completing tasks.

A specific feature of moulding is also its close relationship with play. Spatial figures raise children's interest and encourage them to play. This property makes it possible to organise classes in the form of play, which reinforces interest in modelling and develops children's communicative skills. Regular playing with plasticine improves fine motor skills, stimulates general development and facilitates speech development. During intensive work on a new sculpture children not only work with their hands but also (involuntarily) move their tongue. During cooperation they also communicate with their peers and with adults, which significantly broadens vocabulary and communicative habits.

Based on analysis of source literature and years of observation, Maria Aleksandrovich reached a conclusion that *the first attempt at moulding in plasticine* could be made by one-year-old children. Taking into account the stage of development of cognitive processes, it is required to supervise children's curiosity and their possible desire to taste plasticine or to smear it on the table. That is why work should be organised in such a way that children's attention is focused on the plastic properties of the material. The 'discovery' that modelling clay becomes softer when exposed to the warm touch of their hands, as well as prints left by fingers and hands, will be especially interesting for children. A one-year-old child may have problems with moulding plasticine into a specific shape and will focus on a single activity for a long period. The child may become interested in the possibility of 'tearing apart' pieces of clay and moulding them back together. Taking advantage of the plastic properties of the material we can present ways of creating a balloon, a path, a snake or a dog shape.

At the age of 2 to 3 years, classes with modelling clay can be organized individually or in groups of 2 to 4 children – working with plasticine would take 10–15 minutes. At this age children can easily acquire skills to mould a piece of modelling clay with both hands in order to create a balloon shape or a pie shape. We can teach a child to flatten the clay by clapping.

Later, *at the age of 3 to 4 years*, we can move on to moulding objects based on geometric shapes. For example, we can teach children to turn a balloon shape into a dice shape by a simple hold and flattening. Using two different tasks and a fictional background we can teach children various techniques of changing the shape of clay: flattening, pressing, creating edges and angles, smoothening, stretching, pulling and rolling.

Works made by children *at the age of 4 to 5 years* are characterized given that by this age, children master basic forms and can create works on a given topic or reflecting their imagination. As development of skills connected with using various techniques of moulding progresses, we can suggest using a stylus in order to create various textures on the surface of the clay and to smoothen connections between parts of figures.

For children *at the age of 5 to 6 years* it is important to create figures with a lot of details. They want to create figures with the highest possible degree of similarity to the objects they represent. That is why clay figures are often excessively filled with details, resulting in the main character being 'overwhelmed' and barely visible. Despite the desire to create minute details, the works of children at this age often lack proportions, while the connecting parts are often flimsy. Using a stylus to create various textures raises much more interest. The works of six-year-olds display increasing independence in terms of form and technique.

4 Stages of Normative Development of Modelling

In psychology, there is no single theory that describes the stages of normative development of moulding in clay. However, among the research devoted to children's three-dimensional creative activity, we should highlight studies on the development of clay-moulding skills conducted in the United States by Claire Golomb and Maureen McCormick in 1995. The respondents were children (at the age of 4 to 13 years) and students, and their task consisted of sculpting a mug, a table, a man, a woman, a stooping person, a dog, a cow and a turtle. The researchers proved that age and the type of task influence the quality and diversity of style, form and type of task. What is more, studies have shown that three-dimensional concepts of creating appear at an early stage of the developmental sequence of the ability to mould in clay, and that they begin with a basic and simultaneously primitive form of a three-dimensional concept.

In 1975 Eleese V. Brown conducted her initial study, followed by the next in 1984. Her research made it possible to describe the successive stages in the development of clay-moulding skills. In the course of her studies, Brown asked children to create clay human figures, and she assessed the way in which they coped with this task. The collected data allowed us to distinguish and describe several stages in the development of children's ability to mould in clay. These are:

Scribbling, from 3 to 4 years of age: at this age children make coils, snakes, irregular 'buns' and 'mud-pies,' which can be moulded together in a file with minute details and fingerprints added at random.

The preschematic period, from 4 to 5 years of age: during this period children create recognisable forms; however, these forms are not fully refined and some elements may be missing or different from the rest. Moreover, children like to draw using clay. We can also notice that they create clay heads with bulging eyes, lips and limbs.

The schematic period, from 6 to 9 years of age: in this period, children can create typical static or dynamic objects, either standing or leaning. Most children at this age add the neck, hair and fragments of clothing.

Dawning realism, from 9 to 12 years of age: in this period, children begin to show interest in creating figures with accentuated details and facial forms, on which we can notice features characteristic of a specific sex. Apart from that, we can see clothing with minute details. The clay figures are very stable and look completely realistic.

Naturalism, beginning at the age of 12: in this period, children's figures display a higher level of detail, they have muscles, various objects, the proportions are becoming increasingly realistic and background begins to appear. Some children are better at drawing on flat surfaces than at creating three-dimensional figures (Brown, 1995).

The combination of these forms and their effective use in plastic arts works are enabled by the art of plastelinography.

5 Plastelinography – Its Techniques and Types

Plastelinography = plasticine (modeling clay) – material with the author realises his or her artistic intent, and *graphia* – create, reflect. It is a new drawing technique using plasticine, which is attracting increasing attention from both children and adults. In the process of creating artwork using the plastelinography technique, the work emerges as a result of moulding and smearing plasticine on cardboard or a different hard surface. The background and characters can be oblique as in bas-reliefs (Пластилинография, 2018).

Creating artwork using this technique requires mastering *various devices and techniques* of moulding and drawing with plasticine. The acquisition of these skills initially enables the creation of the simplest elements, however, the level of artwork gradually increases. These techniques include:

- *Rolling out* – we press a piece of plasticine between our hands or two fingers (depending on the planned thickness of the final shape), and we roll it until a cylinder shape emerges, which can be used to create a snake or, depending on the idea, something more than just a thick cylinder.
- *Rolling* – we press a piece of plasticine between our hands or two fingers (depending on the planned thickness of the final shape) and form a balloon shape by making round movements.
- *Pulling* – we press a piece of plasticine between our finger-tips, we pull it and we get a sharp ending, which resembles (for example) a beak.
- *Flattening* – we press a piece of plasticine between our hands or two fingers and flatten it to make a brick or dice shape.
- *Smoothing, pressing and smearing* – these are the most characteristic techniques in plastelinography, performed by pressing using finger tips. They are essential for creating flat and smooth surfaces or for smooth transition from one part to the next.

The following types of plastelinography have been distinguished:
Direct plastelinography – the work is made using soft plasticine spread on a horizontal surface (e.g. a cardboard). The most frequently used techniques are smoothing, pressing and smearing. It is best done using fingers, which gives the effect of brush strokes. This type of plastelinography is suitable for the youngest artists and for adults (Fig. 1).

Figure 1: Anna K., 20, *Jesień* [*Autumn*],
Made under the direction of Maria Aleksandrovich

Reverse plastelinography (stained glass) – the work is created on a vertical surface, with a transparent surface (glass, plastic, plexiglass) on the other side, using well pressed and soft plasticine. The most frequently used techniques are smoothing, pressing and smearing. It is best to use fingers to precisely spread the plasticine on the surface, making sure that the layer is thin. Works made using this technique will be appreciated by preschool children, students and adults (Fig. 2).

Figure 2: Stained-glass plastelinography, Sofia A., 13, *Motyl* [*Butterfly*],
Made under the direction of Maria Aleksandrovich

Plastelinography mosaic – the work is created on a hard horizontal surface using plasticine balloons. The most important techniques are pulling and rolling. This type of work requires patience and focus, though the method itself seems quite simple. One should select a range of colours, prepare many balloons of similar size and fill the drawing with them in a precise manner, being careful not to cross the contours. This type of plastelinography may interest older preschool children, students and adults (Fig. 3).

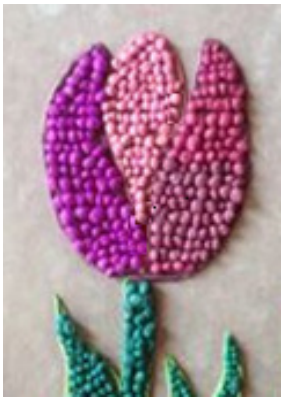

Figure 3: Mosaic plastelinography, Sofia A., 13, *Tulipan* [*Tulip*],
Made under the direction of Maria Aleksandrovich

Module plastelinography – the work is created with various forms and elements: cylinders, balloons and discs. It needs to be made on a rad horizontal surface. This type requires mastering all techniques applied in plastelinography. The drawing is placed on a surface and then filled with various elements and forms, moulded earlier in modelling clay in a given colour. It is a particularly difficult type of plastelinography, suitable for students and adults (Fig. 4).

Figure 4: Module plastelinography
https://sites.google.com/site/volsebnyjplastilin1/plastilinografia/vidy-plastilinografii

Contour plastelinography – the work is created using thin strands on a hard horizontal surface. The technique requires persistence, focus and patience. The most frequently used technique is rolling out. A pre-prepared drawing is gradually filled with strands. These can be prepared by hand or using a syringe (put the clay in the syringe and place the syringe in hot water for 2–3 minutes, which will make it possible to squeeze out identical strings). This type of plastelinography is time-consuming and labour-intensive, hence making it suitable for students and adults (Fig. 5).

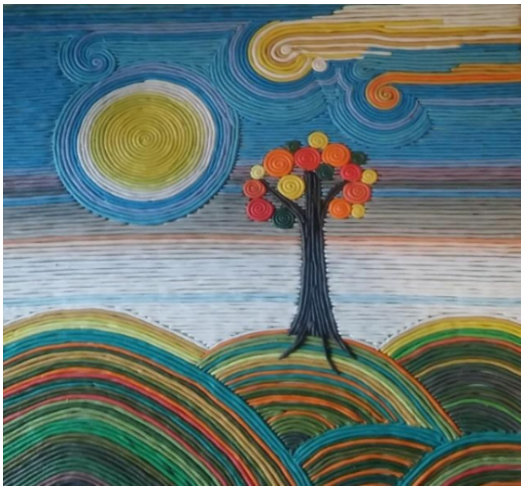

Figure 5: Contour plastelinography, Maria A., 42, *Pejzaż jesienny* [*Autumn Landscape*]

Multi-layered plastelinography – creating a spacious image filled with plasticine, after which several layers are applied on the hard horizontal surface. The most frequently used techniques are smoothing, pressing and smearing. The end result is a beautiful, bright plasticine image with non-standard colouring. This type of plastelinography may be attractive for younger and older pre-schoolers, students and adults (Fig. 6).

Figure 6: Multi-layered plastelinography, Evan L., 8, *Antyczna paproć* [*Ancient Fern*], Made under the direction of Maria Aleksandrovich

Texture plastelinography – creating a plasticine image on a hard horizontal surface in such a way that large fragments are oblique with regards to the rest of the image. This type of plastelinography requires mastering all techniques of working with plasticine. The work can be made using strands, cylinders, snails, balloons, as well as a stylus and stamps. This type of plastelinography is quite difficult, hence making it suitable for students and adults (Fig. 7).

Figure 7: Texture plastelinography, Sofia A., 12, *Stary las* [*The Old Wood*], Made under the direction of Maria Aleksandrovich

Thus plastelinography is becoming a universal method of developing fine motor skills, memory, concentration, creative skills and a sense of aesthetics at every age. Since the 19th century, when the German pharmacist Franz Kolb (1880) and the British businessman William Harbutt (1897) independently invented plasticine, it has found practical application in all branches of art: illustration, web design, typography, clay and designer installation.

6 Conclusions

In conclusion, plastic art classes, especially those in which plasticine plastelinography techniques are used, allow children to acquire experience which is indispensable for school achievement. Moulding in modelling clay is an effective way to prepare children's hands to write, examine the shape of objects they hold, its size, construction, colour and purpose. In order for children to achieve good results in using plasticine it is necessary to meet the following conditions:

- fostering in children an interest in moulding through showing them ready two-and three-dimensional clay works, telling them the history of plasticine and its modern forms;
- telling children about the properties of plasticine, its softness and flexibility;

- showing children the easiest techniques of separating and connecting elements, stretching, flattening, smearing and spreading, while displaying various plastic forms;
- teaching children how to make simple shapes (balloon, ball, stick, snake, snail) and how to finish the work they have begun;
- teaching children how to properly hold plasticine, how to mould it on a table on an adapted surface using a stylus and without scattering it;
- teaching children to put the clay back into the box after finishing in order to start the next classes.

Thus, plastelinography classes stimulate the development of all psychological functions, teach independent thinking, analysis, comparing, development and presentation.

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Contribution of the Authors

Maria Aleksandrovich is the author of the developmental program Plastelinography, who conducted years of observation and practical work with three-dimensional and two-dimensional sculptures, made by children and adults, collected a huge number of creative works, which were used for the analysis in this article. She also conducted comprehensive analysis of the state of research on the problem of the development of interest in modelling in plasticine, stages of normative development of modelling, as well as techniques and types of Plastelinography. She justified the methodological basis of the study; conducted analytical work and prepared the manuscript.

Jacek Kowalczyk conducted a comprehensive analysis of the state of research on the problem of the development of fine motor skills in pre-school and school age and worked at the manuscript.

About the Authors

ALEKSANDROVICH, Maria, Associate Professor, Pomeranian University, Slupsk, Poland. The main fields of research are developmental psychology, psychology of individual differences and psychology of dance. Author of several books, academic textbooks and numerous articles within support of development of gifted and talented, methods of abilities measurement and dance motivation.
Contact: maria.aleksandrovich@apsl.edu.pl

KOWALCZYK, Jacek, Associate Professor, Pomeranian University, Slupsk, Poland. The main fields of research interests are psychocardiology, psychology of sport, equality in education, mental health self-awareness. Author of scientific articles within psychocardiology and equality in education.
Contact: jacek.kowalczyk@apsl.edu.pl

Panagiota Argyri & Zacharoula Smyrnaiou

Case Studies of Educational Systems Focus on Empowerment of Young People's Skills

How do schools prepare young people to enter the labor market and take up an active role in the society's productivity in the 21st century? This question becomes even more complex in today's age of the knowledge and technology revolution, where employers cannot fill vacancies due to skill shortages. In other words, how do schools respond to the development of students' skills? This paper focus on replies to this question with the starting point of educational trends, it presents the existed frameworks of skills, it analyzes basic terms included in the framework of educational systems and mostly it provides knowledge of secondary education systems in a global scale with a presentation of selected case studies. The aim is not to criticize educational policy-making, but to provide important information on innovative approaches to the subjects, practices and teaching methods applied in secondary education curricula to develop the skills for the future generation of labor market. The educational research has implemented as methodology the literature review to analyze and compare the curricula and reports that accompany them in a global scale. The paper is intended to be useful to educators, researchers, and educational policy makers, as the results include a global overview of the good teaching practices included in curricula for the development of young people's skills. Additionally, it is an important source of data for the curricula on the knowledge, attitudes and skills taught, as well as the way they are taught to enhance young people's skills. This could be the starting point for meaningful dialogue and collaboration between workplace and educational institutions, as it provides a characteristic example not only from Europe, but also from Asia and the United States and good practices from different regions. Summing up, we could mention that the development of young people's skills is not a problem but an opportunity for reforming the curriculum in terms of better quality.

Keywords: *Skills, secondary education, curriculum*

1 Introduction

Important issues concerning the environment, the economy, society, change the pace of demands for education, following the pace and speed with which the modern world is changing. Globalization, the so-called 4th Industrial Revolution, demographic change, climate change, the transition to a green economy, but also economic, environmental, geopolitical, social and technological risks (World Economic Forum 2020), characterize the 21st century as the Age of Acceleration, an acceleration of human experience and disruption of forces in every aspect of our lives (Friedman, 2016). If we use the concept of inertia from physics, which characterizes the tendency of bodies to resist the change of their kinetic state, we can state that educational policies worldwide need little or no inertia to promote change and reform in order to prepare the new generation for the world of the 21st century. The investment in next generation means developing the necessary skills of the next generation. Under the context of modern social reality, this paper first maps out new trends in secondary education curricula and then analyzes the

skills framework of the 21st century, following the transformative forces in society, technology and science in order to respond to research questions: i) What are the necessary skills to prepare the next generation? ii) How do schools respond to educational trends for transition of young people to the labor market? iii) Are there mentioned initiatives and efforts in international level for renewing educational systems in the direction of development students' skills?

1.1 Educational trends of the 21st century

Education is a central component in the knowledge economy. In all the reports on the educational trends of the reforms that need to be integrated in education, the dominant element is the provision of effective development of lifelong learning skills through innovative arrangements (internships, curricula) first in school and then through community partnerships (OECD, 2019; 2018; 2017). Technology dramatically affects the types and level of skills required for the future. In addition to digital skills, installing a computer in many tasks requires creativity, i.e. the ability to "find new ideas and solutions" and the "willingness to challenge ideas" (Bialik & Fadel, 2018; Berger & Frey, 2016). The teaching and learning also focuses on the development of the ability to process, analyze information and solve problems, as well as analytical and critical thinking skills. These are broader skills, which while related to disciplinary knowledge, contain intrapersonal functions, such as tolerance and respect for others as well as skills of self-regulation and better understanding of learning processes (Pellegrino, 2017).

Globalization requires the development of cognitive skills, so that young people are ready to produce and share new knowledge products in the rapidly evolving international markets. Social and emotional skills improve academic and labor market prospects, and metacognitive skills are vital to education because of their impact on the learning process (Veenman, Kok & Blöte, 2005). Recognizing the importance of integrating methods and practices that will prepare young people with the required skills (Kaufman, 2013), provides incentives to review curricula globally for cases that can serve as role models.

2 Methodology

This research did not use quantitative methodology to determine how many countries are developing 21st century skills, but it follows critical literature review to investigate for the specific content and methodologies from curricula around the world, that promote the development of students' skills, in order to examine how the educational systems can strengthen the preparation of the workforce. Initially, a critical review of the literature was used for the conceptual mapping of frameworks of 21st century skills with the articles, the reports and working papers of Organization for Economic Co-operation and Development (https://www.oecd.org/, https://www.oecd-ilibrary.org/education, OECD) as a starting point. The European Commission's Eurydice database

(https://eacea.ec.europa.eu/national-policies/eurydice/national-description_en) was also studied for the case studies of the European Educational Systems. Reports on the curricula of the United States, Canada and Australia were also sought separately. In addition, information was sought on education systems in the Asia-Pacific region from relevant reports (UNESCO, 2015a; 2015b; 2016). The criteria of selection countries based on geographical position, (Europe, Asia, Australia, United States, Canada), as we focus on providing educational initiatives for the needed skills is the secondary education on a global scale.

3 Conceptual skills mapping of the 21st century

The existence of different frameworks for describing 21st century skills confirms the need for action in education in the field of skills development. There are many definitions of 21st skills (Fadel & Trilling, 2012; Ananiadou & Claro 2009), which are interrelated and linked to other categories of skills and competence definitions (Basic Skills, Employability Skills, Key Competences, transversal Skills etc.). Transversal Skills are those typically considered as not specifically related to a particular job, task, academic discipline or area of knowledge but as skills that can be used in a wide variety of situations and work settings. People need transversal skills, such as the ability to solve problems, communicate ideas and information effectively, be creative, show leadership and conscientious-ness, and demonstrate entrepreneurial capabilities in order to be able to adapt to the modern world (UNESCO, 2014, cited in Argyri, 2019). Moreover, there are many frameworks, which describe the skills and competencies that the 21st century world demands (Binkley et al., 2012; Gordon et al., 2009; Lippman et al., 2015): Problem solving, critical thinking, creativity, innovation, collaboration and communication are the core of 21st skills (Kay, 2010).

21st Century (P21 Framework) Skills include Critical Thinking, Problem Solving, Creativity, Communication, Collaboration, Innovation, Teamwork, Decision Making, Leadership, Knowledge Innovation, Self-direction and Learning How to Learn (Bapna et al., 2017; Battelle for Kids, 2019; Tharumaraj et al., 2018). The 21st Century Skills Framework is a unified, collective vision for learning to describe the skills, knowledge and expertise that individuals must possess to succeed at work and in life. In this context, 21st century skills are identified by three areas / themes (Stork, 2020):

(a) *Life and career skills:* flexibility, adaptability, initiative and autonomy, social and intercultural skills, productivity, leadership and responsibility (ability to exercise leadership by taking on corresponding responsibilities).

(b) *Learning and innovation*: critical thinking, problem solving, communication, collaboration, creativity and innovation (the skills that focus on creativity, critical thinking, communication and innovation are commonly known as 4Cs).

(c) *Information, media and technology skills:* Information literacy is defined as the ability to recognize when information is needed and to have the ability to locate, evaluate, and use information effectively. *Media literacy* offers the ability to decode, evaluate, analyze and produce print and electronic media (Hobbs & Jensen, 2009). *Technological*

literacy is the ability to use digital technology, communication tools and / or networks to access, manage, gather, evaluate and generate information (Davies, 2011).

DeSeCo (DeSeCo is the acronym of the OECD project Definition and Selection of Competencies: Theoretical and Conceptual Foundations (www.deseco.ch). It was launched in 1998 and concluded with the final report Key Competencies for a Successful Life and a Well-Functioning Society in 2003 and with the Executive Summary in 2005. DeSeCo used the notion key competencies which equates with terms such as transversal, generic, core or 21st century competencies) defined the requirements of key competencies in the light of the requirements and challenges of the modern age and through this approach intensively mobilizes skills, knowledge and attitudes through a process of reflection, anticipation and action (Rychen, 2016; OECD, 2005).

4 Theoretical framework

The curriculum is the roadmap of the educational system. It has a starting point and an end point and it describes the objects and what we will teach, the activities that will take place, but also the paths that will be followed (how we will teach it) (Care & Anderson, 2016). The curriculum is the only means by which we can promote change in education and indicate the knowledge, skills and values that should be taught to students. But the changes that will be implemented depend on the way the decisions for the curriculum are made (Keddie, 2015). The core curriculum (decision-making at national, state and regional level of central administration) provides strong incentives for teachers and schools to adapt innovative teaching approaches to skills development. On the other hand, the decentralized curriculum allows teachers to create their own educational didactic methodological approaches (Kärkkäinen, 2012; OECD, 2004).

The curriculum is dynamic and variable in purpose, organization, and especially content (McNeil, 1977; Cuban, 1992; Elmore & Sykes, 1992; Jackson, 1992; Goodlad & Su, 1992; Leithwood, 1981; Levin, 2007). These differences also justify the different degree to which each country incorporates the broader skills framework (Reimers & Chung, 2016; Halász & Michel, 2011; Cheng, 2018).

Facing the challenges of 21st century, working group members and partners (ERI-Net Asia-Pacific Regional Policy Series, 2014) make proposals for changing the educational systems that will be relevant in different countries over time. On the other hand the comparison with the Framework for K-12 Scientific Education (NRC, 2012), that also included in Massachusetts science and technology/engineering curriculum framework (Massachusetts Dept. of Education, 2001), we could mention common contexts:

- The starting point should be the prior knowledge, skills, attitudes and values.
- Topics should be challenging and allow for deep thinking and reflection. Mostly if there are organized around the explanatory ideas that explain the world, so that the purpose of teaching is to focus on the student's analysis and interpretation of phenomena and experience (authenticity)

The key words that describe the innovative framework of educational systems taking under consideration the challenges of the 21st century are: cohesion, alignment, multidisciplinarity, interface, flexibility, commitment.

Moreover, basic issues for development students skills' based on subjects of curriculum are that the levels of skill development are defined in learning cycles (preschool, primary, secondary and post-secondary) following by learning activities that encourage creative thinking, experiential and active learning, including teaching methods such as exchanging views, teamwork, games, group discussion and public discussion, under multidisciplinary experimental learning to help identify and solve problems in real life and to continue students' previous experiences (UNICEF, 2017; UNICEF, 2018; Riopel & Smyrnaiou, 2016).

Finally, 'alternative training' and its implementation at European level is considered particularly important as it could be one of the most effective means of combating early school leaving and promoting the employability of young people, as it helps to reduce the mismatch between education and the labor market, it promotes a structural link between educational institutions, the labor market and civil society and it correlates the educational offer with the cultural, social and economic development of the territory (Argyri & Smyrnaiou, 2019)

5 Results: Case studies

5.1 European level

Based on description of European Commission's Eurydice database we have selected typical examples:

1) *The National Curriculum of the United Kingdom of England* envisages Personal, Social, Health and Economic Education (PSHE) professionals as a school subject (from 2017 it is compulsory in all schools in England), through which students develop knowledge, skills and characteristics, needed to keep themselves healthy and safe and to prepare for life and work in modern Britain. The curriculum for PSHE education https://www.pshe-association.org.uk/curriculum-and-resources/resources/programme-study-pshe-education-key-stages-1%E2%80%935 (key stages 1–5) aims to develop skills and characteristics such as resilience, self-esteem, risk management, teamwork and critical thinking in the context of learning focused on three key themes: health and well-being, relationships and living in the wider world (including financial well-being and aspects of career education).
2) *The curriculum of Northern Ireland* http://ccea.org.uk/curriculum/key_stage_4 requires by students (ages 14 to 16) to study questions about:
   - Learning about life and work (including contributing elements of employability, local and global citizenship and personal development)
   - Cross-sectoral communication skills, the use of mathematics and the use of ICT
   - thinking skills and personal abilities of self-management, working with others and problem solving.

Although teaching methods and training materials are not provided, the Council for the Curriculum, Examinations and Evaluation (CCEA) provides guidance, resources and educational materials for Northern Ireland curriculum teaching (http://ccea.org.uk/curriculum/resources)

3) In Albania, Skills Guides (Rahmenpläne) have been designed by the Ministry of Education, These guides of individuals offer recommendations for the methodological-didactic arrangement of teaching, known as "*recommendations for the quality of the didactic arrangement*".
4) *In Germany, i*n the context of the United Nations World Decade on Education for Sustainable Development an *Interdepartmental Framework for Global Development Education curriculum* has been published. *T*he revised version of the interdisciplinary framework from June 2015 provides specific recommendations for integrating sustainable and global development issues into the curricula of almost all subjects (natural sciences, foreign languages, mathematics, German, art, music, sports, economics religion, ethics, geography) and shows which students can learn in the classroom if these issues are addressed. This interdisciplinary framework aims to empower the individual to play an independent and responsible role in shaping the individual and social challenges of the future. Moreover, 'consumer education' in schools aims to develop responsible consumer behavior, informing about content related to consumption and developing skills in relation to a consumer behavior that is reflected and enhanced.
5) *In Latvia's educational system included the Entrepreneurship training*, as one of the methods of combining theoretical knowledge and practical skills. By establishing and working in Business Learning, students acquire a variety of basic entrepreneurial skills – business knowledge, sales management, knowledge of financial analysis and design, teamwork skills, presentation skills and general experience.
6) In Greece, since September 2020, by decision of the Ministry of Education (law 4692/2020 Upgrading of the School and other provisions) *'skills workshops'* in a pilot stage, but as a basic part of the curriculum, included in the weekly program as separate subject in the kindergarten, in the primary and in the secondary school are implemented. The aim is to enhance the cultivation of soft skills, life skills and technology and science skills in students, in combination with the formation of a modern program framework with a structure of Open, Live Curricula and Procedure. The educational material will be drawn from the specially designed platform of the Institute of Educational Policy (IEP), entitled "Platform 21+" (http://iep.edu.gr/en/psifiako-apothetirio/skill-labs), which includes educational guides, audiovisual educational material and / or worksheets, suggested school activities for the laboratory and experiential approach to the topic, assessment and self-assessment sheets and, in some cases, information material to parents, appropriately graded by class.