Emotional Empathic Proximal Learning Educational Environment
PEARL
2018-1-IT02-KA201-048515

Training Modules

Emotional Empathic Proximal Learning Educational Environment PEARL	
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Introduction

The Erasmus+ KA201 project PEARL "Emotional Empathic Proximal Learning-Educational Environment" is a project that aims to develop and validate an educational model, innovative and replicable at an international level, aimed at the very first childhood, 0 – 6 years, which favours the growth of children through an empathic and emotional proximal learning educational environment based on group activities. The project has a completely experimental character and aims to create and validate a new inclusive educational model based on concrete and solid neuro-psycho-pedagogical theoretical foundations, integrating academic research (theories of Vygotskij, Piaget, Montessori, metacognitive pedagogy, proximal learning, co-structural, environmental and relational constructivism) with modern educational strategies including peer education, cooperative learning, constructivism and with the use of educational robotics (in particular for the 3-4 and 5-6 years age group). Robotics is used as a tool for inclusion and open communication strategies and especially for the development of relational and emotional skills, thanks to its use in small group activities. For the age group from 0 to 2 years, the possibility of using simpler robots dedicated to these children has been excluded and have been selected other strategies. Therefore, for this age group, the creation of the empathic and emotional proximal educational environment will take place mainly through activities related to nature and respect for the environment, such as developing the internalization of the sense of eco-systemic belonging with the world.
The PEARL model places the group, peer relations, and the development of empathetic emotions at the center of its action for the creation of a proximal learning space that favors a correct approach to robotics technologies as educational and learning tools. In the relationship with peers, the child can take on different roles and is called to cooperate in the small group and to agree by learning to take the other's point of view (Piaget 1932), developing cooperation and sharing skills. The group relationship does not only lead to empathic emotional development but also to cognitive one: the solution of problems, reached in a shared way, is internalized as the content of thought ("genetic law of cultural development" Vygotskij 1934). The methodologies developed by the project will pay particular attention to the inclusion of all children beyond their talents, potential, personal difficulties, or disabilities.

The training modules

The PEARL project aims to develop, test, and validate an innovative and high-quality educational model for the development of an educational environment of emotional and empathetic proximal learning in the age range from 0 to 6 years that can be replicated at the European level. The model lays solid scientific and theoretical foundations in the neurological development of the child and in pedagogy through educational strategies for the development of prosocial skills with the use of robotics.

The proposed program is the basis for training- learning on PEARL model. The program focuses on teacher's support by offering key themes, tools and methods for implementing a different educational approach in pre-school. The challenge and innovation of the course are:

- To combine different pedagogical approaches and educational strategies into an effective method
- To provide practical references to the teachers attending the training

The training modules are divided into two sections:

1. Pre-training module: an introductory part with the main pedagogical theories from which the PEARL model takes inspiration. Teachers will be required to prepare themselves on this material before the actual course; this way all participants will have a common basis from which the training will start.
2. Training modules: based on the contents proposed in the model, the training models collect methods, techniques and topics of the course for educators and pedagogues. A part is dedicated to the implementation of the validation phase

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Main reference pedagogical theories

Piaget's genetic epistemology

The Swiss psychologist Jean Piaget (1896-1980) has elaborated, during his very long and vast activity, a new "philosophy of the mind" founded on empirical bases and on an interdisciplinary integration that was unknown to philosophy. Despite the traditional occidental philosophy that considers the problem of "knowledge" as central, he has shown that he can find new solutions, expressed in a theory of the mind that has as its fundamental requirement the notion of "development". The achievement of the adult ways of thinking is not immediate, but proceeds by subsequent stages, each one plays a necessary and unavoidable role due to the progressive rebuilding of their functioning.
Piaget considered the development of the structure of the mind as a process of continuous reorganization through the interaction between the mind and the environment. The psychogenesis emerged as an evolution - starting from the birth - from simple mental structures (based on action) to increasingly complex structures, based on thought.
Adaptation takes place through two fundamental processes:

- assimilation: allows the body (and mind) to incorporate elements of the external environment into its structures.
- accommodation: produces a change in these structures because of assimilation.

Between assimilation and accommodation, a balance is created that allows the reorganization of mental structures and their ontogenetic development.

According to Piaget the mental development of the child unfolds from childhood to adolescence in two main periods:

- Sensorimotor stage, in the first two years of life.
- Conceptual stage, from two to twelve/fifteen years.

These periods can be divided into various stages. This is a description that still retains its validity today and that represents an essential reference to introduce the concept of evolution of mental structures.
In the essential lines, the characteristics of these stages are the following:

- *Sensorimotor stage* - the child progressively develops his own modes of interaction with the environment.
  - In the first month perception and movement are uncoordinated functions (sees an object but does not know how to grasp it). Then the child adapts the two functions, at the beginning in a rigid way, then more and more adapted to the environment.
  - Between 4 and 8 months the child learns that objects are separated entities and that they continue to exist even if they disappear from the visual field ("permanence of the object" and "permanence of the person"). Images of people and objects are thus formed that are not directly perceived and on which the mind can operate
- Conceptual period - introduction of language and symbols in mental operations.
  - *Preoperational stage* (from 2 to 7 years):
    - Symbolic function substage (up to about 4 years), the classification of objects into categories begins according to certain properties; the "symbolic play" begins
    - Intuitive thought substage (from 4 to 7 years), the mental operations of classification and serialization of objects are developed.
  - *Concrete operational stage* (from 7 to 11 years), in which the child develops the ability to mentally operate on objects using concepts such as number, weight, volume and so on. The fundamental principle of conservation is conquered.
  - *Formal operational stage* (from 12 to 15 years) is the stage of completion of the mental development of the child. It can perform mental operations regardless of the reference to real people and objects, using concepts and symbols.

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Vygotskij's historical-cultural theory

The theory of Lev S. Vygotskij (1896-1934) was developed between the 1920s and 1930s but remained mostly unknown until the 1960s, before becoming the focus of research and studies in the 1980s.
The main innovation introduced by the Russian psychologist is the attention to the genesis of the consciousness of the human psyche.
According to Vygotskij the difference between animals and men is a qualitative leap characterized by the development of higher psychic processes dependent on the historical-cultural context in which a child grows. Both the lower and higher psychic processes are material processes that take place in the brain, with the difference that the higher psychic processes develop in relation to the social and cultural environment.
The contents of the adult's thoughts have been acquired and processed as external (culturally determined) tools, which have become internal instruments over time. Ontogenetic psychic development is therefore a cultural development, as it is essentially based on the process of internalization of the means provided by the socio-cultural environment. Vygotskij defines this process as the "genetic law of cultural development", for which the psychic functions developed in social relations (interpsychic functions) subsequently become internal to the individual (intrapsychic functions).
According to the Russian scientist the school represents the main cultural mediator that the child meets in the first years of life. The relationship between teacher and pupil is not a mechanical process of unidirectional transmission of information from the first to the second, but rather as a circular process of teaching by the teacher and learning by the learner. Therefore, the interpersonal and social character of education is underlined.
Within the framework of this conception, Vygotskij elaborated the concept of "Zone of Proximal Development", that is the area of mental activity that the child can reach with the help of adults, and which comes to be added to the mental activity that he can produce on his own. While this latter activity fundamentally depends on ontogenetic maturation, the socially mediated mental activity anticipates and disengages from these maturing stages. With the help of the teacher the child produces a cognitive performance which he/she would be able to reach at a later (next) stage of his/her development.
In general, the Development Zone is that area between the development level that an individual has at a given moment and the potential level that he/she can reach if guided by an experienced partner (mediator). According to this principle the child learns (and grows) through subsequent stages that are not generally defined for the human species but are epigenetically and socially declined individual by individual. It is the current situation and the context that determines the "proximal" significant learning area, or those learning that the child is ready to achieve.
In other words, each child has his /her own development potential and educators, and teachers must be able to grasp exactly what a child could do with their help. The activities proposed to the single child should be planned so that they are not too easy, because they would lead to boredom, or too difficult because they would risk demotivating the child.

Montessori learning experience through a finalized task using tools

The Montessori approach adopted a philosophy arguing that every child should be given their own domination and freedom. It is a child-centered approach that allows children to learn at their own pace. In the Montessori approach, it is emphasized that the five sense organs must work actively in learning (Koh and Frick, 2010). The PEARL Education Model also gives importance to children's learning by doing and experiencing.
Maria Montessori (1870-1952) was among the first women to graduate in medicine in Italy and devoted herself to psychiatry andchildhood.
Her method began to develop when she turned her attention to observing children between three and six years of age. Her predecessors Séguin and Itard had initiated what she would later develop as her own method for the development of the child in the midst of growth and discovery of the world. The three doctors had in common their observation of children with sensory deficits or various forms of disability. This particular one represents the starting point for the birth of an educational path based on sensory stimulation, especially tactile stimulation. In fact, the resulting material, especially that of the Montessori method, aims

to work on fine motor skills and eye-hand coordination. All the activities created aim at educating the senses and show a strong connection between the use of touch and the possibility of cultural and psychological growth. Montessori focuses on hands that touch, manipulate, discover, search and create. This woman was able to intuit what neuroscience confirmed almost a century later: experiences, actions and relationships with objects, through the senses, implement synaptic connections. The materials are objects that have the power to make an abstract concept experiential and keep it active through reiteration.

According to Montessori, another fundamental element that helps the child to grow is error. In the course of an activity, the child experiences mistakes (e.g. playing a game of interlocking pieces), which become essential for growth. By nature, mistakes are not a source of anxiety; on the contrary, they are a valuable part of the learning process. Mistakes stimulate reasoning, changing strategies in order to achieve a goal. Maria Montessori calls it the child's friend.

Montessori underlined also the unique importance of two elements that are indispensable for the harmonious growth of children: the teacher and the class group. The former has a special task, which is to 'open the way', to be a guide for those who are discovering the world and themselves. The teacher never replaces the child, but lets the discovery be the real teacher that will trigger learning. The second (the group of peers) is essential for communication and the building of relationships capable of promoting and pursuing a common goal: to achieve a harmonious and complete development through the experimentation of the surrounding world (in our case, a learning environment designed specifically to achieve this goal).

Bandura's social learning theory

The research of Albert Bandura (1925-2021) expanded knowledge about learning processes, drawing attention to the various ways in which social experiences contribute to personality and conduct regulation. Bandura, distancing himself from the current of behaviourism, emphasised how learning does not only occur through direct contact with the elements that influence conduct, but how it can be mediated through the observation of other people through a process of modelling.
Bandura's social learning theory emphasizes the importance of observing, modelling, and imitating the behaviours, attitudes, and emotional reactions of others. Behaviour is learned from the environment through the process of observational learning.
In society, children are surrounded by many influential models (individuals that are observed) that provide examples of behaviour, such as parents within the family, characters on children's TV, friends within their peer group and teachers at school. Children pay attention to some of these people (models) and encode their behaviour. At a later time they may imitate (i.e., copy) the behaviour they have observed.

There are three core concepts at the heart of social learning theory.

1. People can learn through observation.

Bandura identified three basic models of observational learning: a live model (which involves an actual individual), a symbolic model (which involves real or fictional characters), a verbal instructional model (which involves descriptions and explanations)

2. Internal mental states are an essential part of learning process.

Bandura noted that external, environmental reinforcement was not the only factor to influence learning and behaviour and identified also intrinsic reinforcement as a form of internal rewards, such as pride, satisfaction, and a sense of accomplishment.

3. Just because something has been learned, it does not mean that it will result in a change in behaviour.

Individuals do not automatically observe the behaviour of a model and imitate it. There is some thought prior to imitation, and this consideration is called mediational processes. This occurs between observing the behaviour (stimulus) and imitating it or not (response). Furthermore, we have a lot of cognitive control over our behaviour and just because we have had experiences of violence does not mean we have to reproduce such behaviour.

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The social learning is influenced by three aspects. First, the child is more likely to attend to and imitate those people it perceives as similar to itself. Consequently, it is more likely to imitate behaviour modelled by people of the same gender. Second, the people around the child will respond to the behaviour it imitates with either reinforcement or punishment. If a child imitates a model's behaviour and the consequences are rewarding, the child is likely to continue performing the behaviour. Third, the child can also take into account of what happens to other people when deciding whether or not to copy someone's actions. A person learns by observing the consequences of another person's (i.e., models) behaviour. This is known as vicarious reinforcement.

One of the most important aspects of Bandura's view on how personality is learned is that each one of us is an agent of change, fully participating in our surroundings and influencing the environmental contingencies that behaviorists believe affect our behaviour. According to Bandura, social learning theory emphasizes that behaviour, personal factors, and environmental factors are all equal, interlocking determinants of each other. This concept is referred to as reciprocal determinism.

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Training Modules

1. The environment of proximal learning and educational emotions

Abstract

During the training the definition of environment of proximal development and educational emotions are presented and discussed. The goal is to learn the innovative pedagogical approach of PEARL and how it can improve the children's development. The examples of practical activities offered that allow mapping theory with practice.

Learning outcomes

Be able to understand the general approach of PEARL for pre-school education
Be able to identify the importance of educational emotions and proximal learning environment

Type of the input

Presentation

Module content

The PEARL education model places peer relationships and the development of empathic emotions at the center of the model, as well as group interaction. Children turn to their peers at moments of difficulty that they face in accordance with their level of development. In relationships with peers, the child can take on different roles, cooperate in a small group, learn the perspective of others and develop sharing skills. Group relationship provides not only emotional development but also cognitive development: solving problems together is internalized by children. In the PEARL educational model, educational robotics and nature activities have been applied to create challenges appropriate to children's developmental levels. The model aimed to demonstrate that these issues, which are generally related to cognitive development, can develop empathic skills such as cooperation and sharing in children when the proximal educational environment is created.

<u>Educational Emotions</u>

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Educational Emotions are those that lead to the well-being of the child, that facilitate harmonious development and that stimulate the educational process, for example joy, trust, interest, serenity, …
When talking about emotions we usually refer to positive and negative emotions.
By negative emotions we do not mean those such as anger, sadness, fear. It is important that children learn to know and express these emotions because they are part of life and have their own personal, developmental and social function.
By negative emotions we refer to those that are non-educational, that cause a block in the educational and growth process. One of the non-educational emotions on which it is essential to act is the fear of error and of making mistakes. An empathic and emotional educational environment permit to develop a positive view of the mistakes as part of the growth.
Growing and learning in a positive, empathetic and emotional educational environment allow children to develop a better self-knowledge and to increase their social and relational skills. An empathic environment that welcomes the children, freeing them to express themselves to the best of their abilities and in which they learn to express their own emotions and recognise those of others.
In early childhood, communication is mainly through this aspect. Being free to act and communicate, in an environment that provides educational stimulation through group activities, children develop a greater ability to communicate non-verbally and to understand the communication of others, improving empathy.

Play is a natural regulator of social relationships and its value in education should be strongly taken into account not only in early childhood.
Since educational emotions are based on what brings a feeling of well-being to the child, play is one of the most useful elements in understanding the application of this approach. Play is not just about having fun. Through play, the child can: experiment with new cognitive paths, safely explore its limits, strengthen skills, overcome the fear of error and judgement, strengthen social (and pro-social) skills,…
During social play, children develop their ability to control themself and their reactions. In play there are rules that must be followed, but at the same time play is characterised by imagination and creativity. Play allows the progressive acquisition of the ability to be in a group and to develop divergent and creative thinking.

Proximal Learning Educational Environment

The '*Proximal Learning Environment'* is an evolution of Vygotskij's concept of Zone of Proximal Development. It is a transmission of knowledge, responsibilities, roles and intuitions in groups, where peer education becomes a collective, evolutionary learning process. The concepts of proximity is no longer only mental/cognitive, but it takes also its concrete meaning of closeness. The group relationship, in the actual space of the class where the children act and play, fosters and nurtures the potential development of each child capacities and abilities.
Group relationships stimulate abilities, like collaboration and positive communication, they facilitate peer scaffolding and mutual help. This learning takes place playfully and naturally, developing attitudes of listening to each other.
The group also acts as a motivator for the learning experience: the experience of frustration while facing difficulties is shared (and therefore better experienced), children with greater abilities become an example to be followed, communicative exchanges make the experience richer and more stimulating. Within a group emerge dynamics of closeness and estrangement, inclusion and exclusion that intensify emotions and structure the child's personality. The respect and understanding for the emotional aspects is fundamental in the proximal learning educational environment, that is why we have underlined the importance of create an empathic atmosphere. All the children have to feel understood and respected in the expression of their feelings.

Theoretical references

Piaget: empathic emotional development in the relationship with peers, (taking different roles and points of view)
Vygotskij: cognitive development internalizing the processes to reach a shared solution
Montessori: learning experience through a finalized task using tools

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2. Robots in Early Education

Abstract
During the training, the main concepts of educational robots in early education are presented and discussed. The goal is to learn the benefits, challenges, and strategies of incorporating educational robots in early education. The examples of practical activities offered that allow mapping theory with practice.

Learning outcomes
Be able to recognize the benefits, challenges, and strategies of incorporating educational robots in early education
Be able to analyze and identify specific difficulties in learning and teaching with educational robots

Type of the input
Presentation, practical activities

Module content
Educational Robotics refers to the theories and studies of Papert based on the advantages of using simple robots for educational purposes. Constructivism of Papert states that learning is more effective when it is not only mental but is supported by an actual construction, by an activity such as the construction of a significant project. The best learning will not come from finding better forms of instruction but from offering the learner better opportunities to build (Papert, 1999). We know far more than we can explain or provide evidence. This phenomenon is named "Polyani's paradox" (2014) and tell us that we have greater capacities than we can evidence. This is nowhere more apparent than in the educational field. Never has this been more prescient than in our era. Intuition allows us to 'know' something before we have analyzed it rationally.
Schools are places in which rational decisions dominate, but the wealth is not in our ability to read texts or solve mathematical equations. Our wealth is due to the deep-down-things that make us human - those 'harder to teach/harder to measure' qualities fitted in all of us, like creativity, instinct, intuition, curiosity, etc. As we must prepare the citizens of the world to communicate, cooperate and collaborate. New generations will need abilities to operate at higher-thinking levels and learn to share their knowledge.
Experts suggest that education should focus on improved inter & intrapersonal communication for problem-solving, interaction and behaviour. This will facilitate increased innovation and creativity, depending on group-sharing, discussing, reviewing, and refining ideas, to fit students for more interactive, discursive roles.
Children seem to possess a natural fascination for robots.

<u>Potentiality of robots at early ages</u>

1. The brain has an emotional filter known as 'amygdale', filtering incoming stimuli and information. It accepts information and stimuli only if it is 'stress-free. This implies the more positive emotions we introduce our kids to, the more we will promote development.

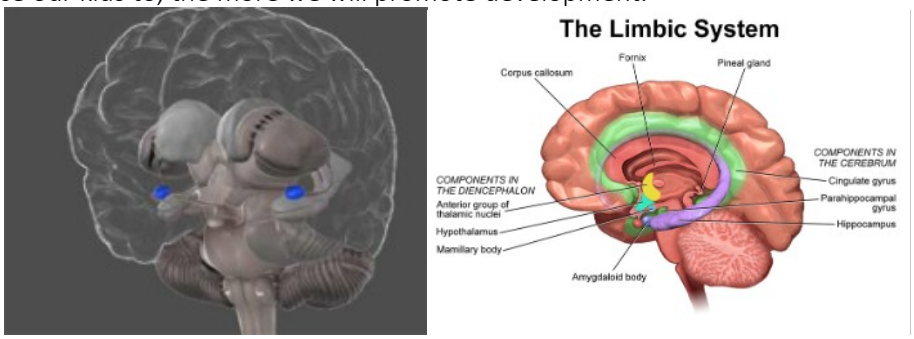

Figure 1 – Example

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2. If a child's emotional center identifies stress, it prompts the brain to fight, flock, flight, and freeze back. It simply means that when the learning environment is stressful, kids tend to cry or throw a tantrum (fight), want to run away from the activity (flight), start behaving aggressively as a class (flock), are unable to reply or respond (freeze).
3. The most critical role of early years educators and parents in fostering learning is to provide the stimulation and encouragement to help children develop and practice their thinking, learn by DOING, make mistakes, and learn from them (Dr. Swati Popat, 2019).
4. When we support children in this, we help children take significant steps towards becoming confident.
5. The new millennium requires children to live in an ever-changing technology-filled world.
6. Supports student-centred teaching.

Cognitive and relational aspects

1. The possibility to give the robot a series of commands and see them executed correctly gives children a sense of control over the outside world.
2. The team spirit strengthens a sense of belonging and decreases the risk of hostile attitudes. Robots focus on the story-telling structure to encourage the assembly of ideas, formal communication, cooperation, and creativity. Students in groups are challenged to come up with solutions. Time and quality of attention are increased compared to traditional classes. Through play children learn from direct experience, this is, they are allowed to observe and experiment. Children appreciate the value of working in a positive atmosphere and constructive relationship, based on respect.
3. Students help or are helped by peers to discover their own and the abilities of others. Educational Robotics is an inclusive tool, proposing other paths to access knowledge, backed by group activities.
4. The use of robotic tools facilitates team learning. In peer groups or as a school class, students can discuss freely and propose solutions in what is called 'proximal learning' (Vygotskij). The specific context is a game, creating possibilities among pupils.
5. In education, robots fulfil learning targets more quickly, accurately, and successfully, allowing teachers to concentrate on character and competence building for students.
6. Educational robotics creates a combination of fun and education to make the students interested in learning (Eguchi, 2014).
7. Carrying out increasingly complex tasks increases self-confidence and abilities and therefore increases self-esteem.
8. The added value of using robotics is to create a learning environment based on fun, where children are fascinated by the novelty, as mentioned above.
9. Through engagement, Educational Robots can foster positive emotional states and social relationships that promote positive learning attitudes and environments, which improves the quality and depth of a student's learning experience.

A step forward: From educational robotics to prosocial robotics.

1. Prosocial Robotics is a more powerful tool to promote social relations. Work in a team stimulates collaboration among students, and therefore everybody has the opportunity to participate in group activities, improving social relationships with other pupils.
2. Robotics activities used as group activities can be essential for developing social and prosocial skills. For that mean, activities should have a playful basis, and it is the game that allows students to feel in a protected environment, experiment with different roles and talk about themselves in a mediated or metaphorical way.

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Figure 2 – Example

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3. Observation of the group dynamics / Assigning roles

Abstract

During the training, the main concepts of group dynamics are presented and discussed. The goal is to learn strategies of group dynamics and prospects of assigning roles. The examples of practical activities offered that allow mapping theory with practice.

Learning outcomes

Be able to apply a collaborative learning approach in practice
Be able to analyze and identify specific difficulties in group dynamics

Type of the input

Presentation, practical activities

Module content

Relational Dynamics is an approach to leadership and life that draws on theories and tools from a wide and eclectic range of sources, including person-centred coaching, psychology, emotional intelligence, NLP (neurolinguistic programming) and contemporary research into leadership and modern-day communications.

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This is the art of interaction with self and others. The interaction can be one to one, one to two and so on..., mutual or one-way.

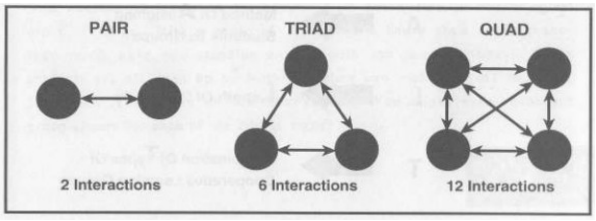

Figure 2 – Example

A sociogram is a graphic representation of social links that a person has. It is a graph drawing that plots the structure of interpersonal relations in a group situation.

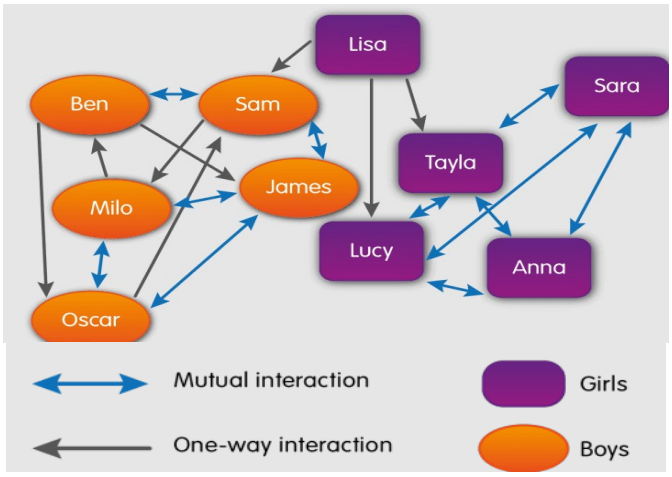

Figure 3 – Example

PEARL is based on group work as a teaching and learning methodology. When children are working in groups, they are working collaboratively. Cooperative learning is a form of collaborative learning, in which the group works together to maximize their own and each other's learning. In cooperative learning, the development of social skills is very important.

CHILDREN'S INTERACTION

COUNTRY: Lithuania	RECORDED: 1st day		1/2 yo		OBSERVER: 1	
	CHILD 01	CHILD 02	CHILD 03	CHILD 04	CHILD 05	WITH ALL	WITH TEACHER
CHILD 01		0	0	I 1	0	1 II	2
CHILD 02	0		I 1	I 1	I 1	3 IIIII	5
CHILD 03	0	0		0	0	0	0
CHILD 04	0 II	2	0			2 I	1
CHILD 05	0	0	0	0		0	0

Cryteria for quantifying interacion by each children:
0/3 INTERACTION:
4/6 INTERACTION:
7+ INTERACTION:

Brown	1
Blue	5
Orange	2
Green	3
Yelllow	4

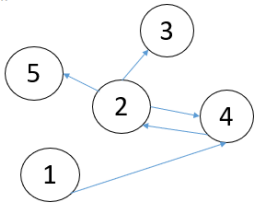

Figure 4 – Example

The benefits of cooperative learning:

1. It helps to raise the achievement of all students.
2. It helps to build positive relationships among the students, thus creating a learning community in which diversity is valued.
3. It gives students the experiences they need for healthy social, psychological, and cognitive development (Johnson, Johnson and Holubec, 1998).

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Why is a role important?

1. A child is obliged (to some extent) to participate in the activity –> more efficient learning
2. Provides the structure, rules, and mutual agreements that everyone tries to follow –> self and social-awareness
3. Allows a child to try different roles –> learn about themselves more
4. Learning takes place through a dialog among children in a social setting-> learns to communicate and express themselves
5. Enhances the ways to involve children with special needs (including learning disabilities and attention deficit disorders) –> personalized

Learning with roles enhances 4 dimensions:

1. Social - promotes social interactions, helps develop oral communication skills, gives the chance to teach and learn desired/appropriate behaviours and other social soft skills.
2. Psychological – enhance student satisfaction with the learning experience, develop interpersonal relationships among students, helps to build student self-esteem, higher self-efficacy, creates a safe, nurturing environment, promote an encouraging environment.
3. Academic - verbalization plays a significant role in task solution, thus it helps them to develop more clear concepts, there is more of a potential for success when students work in groups. Individuals tend to give up when they get stuck, whereas a group of students is more likely to find a way to keep going.
4. Assessment - It provides instant feedback, it helps to detect misconceptions early enough to correct them, use more authentic assessments such as observation, peer assessment and writing reflections can be incorporated, ensures individual accountability.

What is the ideal group size?
It depends on the children's age, the children's experience, the nature of the learning activity, the time available, the materials available, etc.

How to assign the roles?

1. Random assignment – e.g., perhaps by choosing a coloured piece of paper or a ticket from a jar with a particular sign for the role.
2. Teacher assigned roles – the teacher strategically decides on each role in a group.
3. Self-assigned roles – the children choose their own roles. It is sometimes stated that this is the least preferable way of assigning children to roles, as high achieving children tend to put other children into the shade. There is also a danger that the same role frequently will be selected by the same child. However, the teacher knows his/her class best, and there may be occasions when the self-selected group.

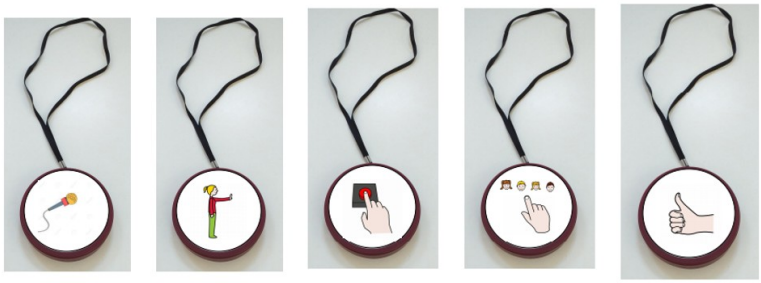

Figure 5 – Example

Roles in PEAR: The groups are formally structured, and each person in the group is assigned a certain role.

3-4 years with robot	3-4 years without robot

4. **Broadcaster:** Propose the sentence to build. Read the sentence written with images and geometric figures. Remind the task or tasks to the group.
5. **Custodian**: Ensure the order and that everyone is respecting their role avoiding fights within the group. He/she will also place the happy faces for the evaluation.
6. **Coach**: decides who should answer. He/she will decide who has top ut the image on the panel with velcro or in the panel for the geometric figures
7. **Referee**: he/she will decide whether the result is fine or if the group needs to rethink about it and change if needed
8. **Actor**: press the buttons on the robot, following the agreement of the group.
9. **Broadcaster**: Reads the sentence written with images and geometric figures Reminds the task to the group.
10. **Custodian**: Ensures the order and that everyone is respecting their role avoiding fights within the group. He/she will also place the happy faces for the evaluation.
11. **Coach**: decides who should answer. He/she will decide who has top ut the image on the panel with velcro
12. **Referee**: he/she will decide whether the result is fine or if the group needs to rethink about it and change if needed
13. **Actor:** he/she will attach the colour or the geometrical shape in the second velcro

Figure 6 – Example

Some tips

1. Do not use every role when doing group work. The main roles are the manager, encourager, recorder keeper and reporter. The entire group/class could evaluate and reflect at the end of the activity.
2. Revolve the roles within the group on a regular basis.
3. Adapt the roles to suit the activity and needs of the class; for instance, if you are using group work in creating art, you may not always need a record keeper.
4. Groups work best when there is no more than four/five within the group. It is proven that groups of seven or more are not productive and do not work efficiently.
5. After modelling, allow the children time to create rules for group work to optimize time and learning.

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4. The influence of teacher's expectations on activities' results / The importance of letting children make mistakes

Abstract

During the training, the main challenges of teacher's expectations on activities' results are presented and discussed. The goal is to learn why expectations management is essential and set the main expectation towards letting children make mistakes. The examples of practical activities offered that allow mapping theory with practice.

Learning outcomes

Be able to set and manage proper expectations on activities' results

Type of the input

Presentation, practical activities

Module content

The PEARL model is based on the constructivist theories of education. These theories emphasize children's constructing knowledge through direct experience instead of memorizing information provided by others (Perkins, 1999). Concrete experiences in educational environments equipped with well-designed materials make it easier for children to construct knowledge. Children's active participation in such environments in their learning processes and direct experience results in permanent learning (Cole & Wertsch, 1996). Learning through direct experience consequently leads children to make mistakes in the learning process called trial and error. The trial and error is a learning method that children use naturally. Starting with infancy, children learn many behaviours, first by imitating and then by trial and error (Bekkering , Wohlschlager & Gattis , 2010). Donaldson (2019) identifies three types of mistakes that takes place in a preschool setting:

1. Content-specific misunderstandings (mistakes children make in a subject matter or a concept, e.g., leaving out numbers when counting from one to ten)
2. Process mistakes usually result from not paying attention to the teacher's instructions (e.g., failing in following directions and completing a task)
3. Behavioural and/or social interaction related mistakes (e.g., speaking out when silence is needed, pushing a friend, grabbing a toy from someone without asking for permission, not waiting his/her turn to speak etc.)

The role of mistakes in children's learning is long-lasting: "As is true for all learners, children respond to mistakes with their brains, bodies, and emotions… These early experiences could have a lasting effect on a child's perception of mistakes for years to come." (Donaldson, 2019, pp. 187-188) Making mistakes is a crucial part of learning new skills and deepening understanding. However, if the classroom social and emotional climate does not welcome children's making mistakes, they tend to shy away from intellectual risk-taking (Donaldson, 2019, 2020).

Children may display two types of emotional response when they make a mistake (Donaldson, 2019):

1. Dysfunctional responses inhibit learning (e.g., response with frustration and fear such as getting angry, shutting down, or discontinuing working.)
2. Functional responses enhance learning (e.g., accepting mistakes as part of the learning process and even having fun out of it).

If the children feel free of judgements from peers or the teacher when they make a mistake, they display functional responses. They can find alternative ways of solving the problem. Mistakes, in this case, can provide an opportunity for the children to review their solutions and take time and find a new one.

Mistakes sometimes create a joyful moment, primarily when children work in small groups to laugh and have fun. This type of positive emotion can also lead children to collaborate and learn from each other.

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Teachers' Role in Children's Learning from Their Mistakes

Children's type of response (functional or dysfunctional) when making a mistake depends mainly on the classroom social and emotional climate. The teachers determine the social, emotional climate of a classroom to a large extent through dialogue, tone of voice, facial expressions, and classroom norms that they set. Children respond to their mistakes differently in different classroom settings:

„Children hey are attuned to social cues and are apt to mirror the actions and orientations of their teachers. This may also be the case for teacher attitudes about the role of mistakes in learning. If early childhood teachers frame mistake-making as usual and expected, it may precipitate adaptive student responses to errors and help promote intellectual risk-taking and "growth mindsets" (Dweck, 2006) toward learning. However, if teachers frame mistakes to eschew or quickly eliminate, children may shy away from academic challenges and miss opportunities to practice new skills and expand their understanding." (Donaldson, 2020, p. 56)

Figure 7 – Example

PEARL education model is a child-centred education model that values the role of mistakes in children's learning. Unlike teacher-centred education approaches, it is essential for the PEARL model that the teachers provide children with a safe social and emotional environment to feel free to make and learn from their mistakes instead of feeling embarrassed, fearful, upset or frustrated.

A socially and emotionally safe preschool setting:

1. Helps children self-regulate their own learning,
2. Makes learning long lasting,
3. Encourages children to take intellectual risks and to be open for explorations,
4. Allows children to have fun while they are engaged in the learning process,
5. Leads higher peer interactions,
6. Helps children persevere on a failed task,
7. And once they accomplish their goal, trial and error provides them with a sense of accomplishment.

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5. Inclusion of the disability

Abstract

During the training, the use of educational robots as tool for the inclusion of children with disabilities is presented and discussed. The goal is to provide teachers with deeper knowledge about the potential of educational robotics. The examples of practical activities offered that allow mapping theory with practice.

Learning outcomes
Be able to identify the potential use of educational robots with disable children

Type of the input
Presentation, practical activities

Module content
Attractiveness of the DOC robot

DOC has a nice shape and physiognomy, which stimulate child's care for it, DOC has coloured catchy lights, DOC goes where the child wants, this communicates to the child that he can control external events, DOC says simple and clear things. The sounds he emits are clearly distinguished, give immediate feedback to the child. Robot Doc produced by Clementoni, one of the project's partners, was used to give children robotics and coding skills. It is known that robots help improve numerical thinking skills (Bers, Flanney, Kazakoff, & Sullivan, 2014).

Figure 8 – Example

Cognitive aspects improved with the robot

Increase timing and quality of attention, favours the development of superior competences, facilitates the learning of abstract concepts, achieving successes and learning progress have a positive effect on self-perception. In particular for the children with special needs, Use of fine motor skills to press the buttons, Plan strategies to reach the goal, Understand the orientation concepts, Repetition of the activity as much as needed

Robot and Inclusion

Attracts the curiosity, Robot as a shared educational toy, Common language (also with no words)
Can foster the help attitude, Every one can make a mistake, the ones with difficulties are like the others

Figure 9 – Example

Resources

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6. Assessment and methodology

Abstract

During the training, the assessment scientific methodology and pilot study strategies are presented and discussed. The goal is to learn how to assess the flow of activities and provided meaningful results. The examples of practical activities offered that allow mapping theory with practice.

Learning outcomes

Be able to set the experiment according to the methodology provided
Be able to gather the results of the experiment

Type of the input

Presentation, practical activities

Module content

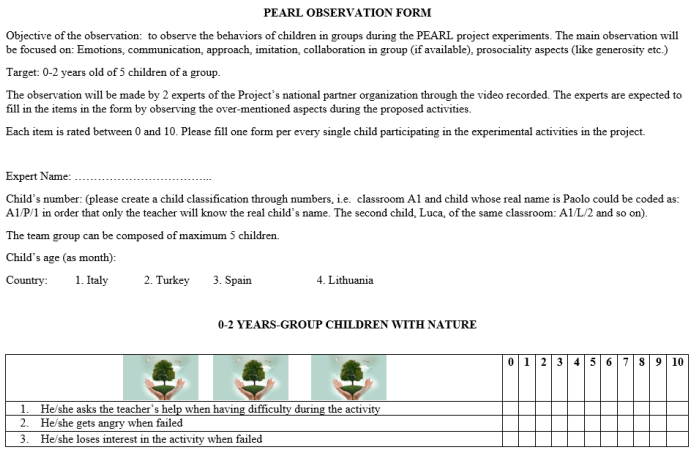
The PEARL Education Model is carried out with the non-selective semi-experimental research model with the final test control group. The characteristic of this experimental model is the creation of randomly determined experimental and control groups and the determination of the effectiveness of the applied model by the final test (Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz and Demirel, 2016).
"PEARL Child Observation Form" was prepared and s used to evaluate the effectiveness of the PEARL Education Model. A total of 10 observation forms were developed.
Observation forms prepared for 0-2 years are as follows:

1. Child Observation Form applied by integrating natural materials into a child
2. Child Observation Form for the group, which is applied by integrating natural materials into a group of 5 children

Observation forms prepared for 3-4 and 5-6 years of age;

1. Child Observation Form of the event applied to a child without a robot
2. Child Observation Form of the event applied to a child with a robot
3. Child Observation Form for the group, which is applied to a group of 5 children of the event without a robot
4. Child Observation Form for the group applied to a group of 5 children of the event with a robot

Observation forms contain at least 9- at most 51 items. Some of the items contained in the forms are intended for positive-desirable, and some are intended for negative-undesirable behaviours. All items in each form are graded with Likert type between "0" and "10". Absence of a behaviour is evaluated as "0", and execution at the highest level is evaluated as "10". For example, "He invites his/her teacher to join the game." If 0 is marked for the item, the child has never invited his/her teacher to the game; if 10 is marked, it means that he/she has invited his/her teacher to the game quite often.



PEARL OBSERVATION FORM

Objective of the observation: to observe the behaviors of children in groups during the PEARL project experiments. The main observation will be focused on: Emotions, communication, approach, imitation, collaboration in group (if available), prosociality aspects (like generosity etc.)

Target: 0-2 years old of 5 children of a group.

The observation will be made by 2 experts of the Project's national partner organization through the video recorded. The experts are expected to fill in the items in the form by observing the over-mentioned aspects during the proposed activities.

Each item is rated between 0 and 10. Please fill one form per every single child participating in the experimental activities in the project.

Expert Name: ……..

Child's number: (please create a child classification through numbers, i.e. classroom A1 and child whose real name is Paolo could be coded as: A1/P/1 in order that only the teacher will know the real child's name. The second child, Luca, of the same classroom: A1/L/2 and so on).

The team group can be composed of maximum 5 children.

Child's age (as month):

Country: 1. Italy 2. Turkey 3. Spain 4. Lithuania

0-2 YEARS-GROUP CHILDREN WITH NATURE

	0	1	2	3	4	5	6	7	8	9	10
1. He/she asks the teacher's help when having difficulty during the activity											
2. He/she gets angry when failed											
3. He/she loses interest in the activity when failed											

Figure 7 – Example

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PEARL Training Model hypothesis is that robots can develops skills such as group sharing, social and communication skills, empathy, creativity, personal expression, etc. Robots are used to develop prosocial skills and values in this project.
Experimental applications in the development of the PEARL Education Model were carried out in two stages. These stages are:
1. Pilot Application,
2. Secondary Applications.

Pilot study strategies
PEARL education model was administered on the 1-6 age group children specified as the experimental group in Italy and Lithuania, the 3-6 age group children determined in Turkey, Spain, Italy and Lithuania.
In the pilot application, a separate experiment and three control groups were created for the 3-4 and 5-6 age groups. For 0-2 age group there is one experimental and one control group. Experimental group in 3-4 and 5-6 age groups, are children that were involved in activities with the robot. Children who were involved in the single child with robot, single child without robot and a group of children without robot constituted the control groups. The robot did not take part in the activities of children in the age group of 0-2 years. In this age group, children who participated in group events with materials with nature content created the experimental group, and children who participated in individual events created the control group.
Two separate study groups were formed in the project. The first study group is created for the pilot application. Because of the inclusive nature of the project, if there are any children with special needs in the school, they were specifically asked to join the experimental groups. In the second phase (roles were included) of the experimental application, the PEARL Education Model was aimed to reach more children. For this purpose, applications of project activities have been started in schools that are voluntary (Ömeroğlu et al, 2021).

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