PROPOSAL FOR INTERVENTION IN MUSEUM ENVIRONMENT AIMED AT PROMOTING EMOTIONAL COMPETENCE

PROPOSTA DI INTERVENTO IN AMBITO MUSEALE FINALIZZATA ALLA PROMOZIONE DELLA COMPETENZA EMOTIVA

Claudia Chierichetti[1]
Niccolò Cusano University
claudia.chierichetti@unicusano.it

iD

Elisabetta Tombolini[2]
Niccolò Cusano University
elisabetta.tombolini@unicusano.it

iD

Gabriele Loconte[3]
gab.loco97@gmail.com

iD

Stefania Morsanuto[4]
Pegaso Telematic University
stefania.morsanuto@unipegaso.it

iD

Double Blind Peer Review

ABSTRACT

This paper outlines the methodological framework of a research study to be conducted at Explora, the Children's Museum of Rome, which aims to explore how multisensory experiences can enhance children's emotional awareness. The experimental group will undergo a program designed to promote body schema development and interaction with various sensory channels. Following this, both the experimental and control groups will receive an intervention implemented using an interactive projector, aimed at enhancing their ability to recognize emotions. The use of the NEPSY and TEC tools will enable the assessment of any differences between the two compared groups.

Il presente lavoro illustra il quadro metodologico di un progetto di ricerca, che sarà condotto presso Explora, il Museo dei Bambini di Roma, per esplorare come le esperienze multisensoriali possano migliorare la consapevolezza emotiva dei bambini. Il gruppo sperimentale sarà destinatario di un percorso che intende promuovere lo sviluppo dello schema corporeo e l'interazione con diversi canali sensoriali. Successivamente, a questo gruppo e al gruppo di controllo verrà proposto un intervento, attuato attraverso l'uso di un proiettore interattivo, che mira a migliorare la capacità di riconoscere le emozioni. L'utilizzo degli strumenti NEPSY e TEC permetterà di valutare eventuali differenze tra i due gruppi a confronto.

---

[1] Author of paragraphs n. 1, 4, 5, 6
[2] Author of paragraphs n. 2, 3, 6 and conclusion
[3] Author of introduction
[4] Research Supervisor

Introduction

In the current scientific landscape, there is a surpassing of the traditional learning environment concept in favour of a new awareness that extends beyond conventional school contexts, including new places that offer opportunities for individual training and interaction. In this perspective, museums emerge as dynamic spaces for informal learning experiences.

In particular, Children's museums are interactive environments that, thanks to an experiential approach to learning, allow children to learn by exploring, through play and the approach of learning by doing, thus offering more engaging and meaningful experiences (Dewey, 1916). Learning through exploration involves active involvement of the child in manipulating objects and interacting with the surrounding environment, engaging not only the mind but also the body. In Children's Museums, children experience an immersive journey that encourages physical, tangible engagement with the objects present in the environment.

The importance of bodily experience in knowledge acquisition processes is a concept founded on the construct of embodied cognition, which emphasizes that the body is not a passive vehicle separate from the mind but an integral component of the cognitive process, actively involved in the learning process (Piccinno, 2019). Through bodily experience, individuals interact with the surrounding world, acquire knowledge through direct sensory experiences, and develop an understanding of the environment around them. Understanding the interconnection between body, mind, and environment in the act of learning can promote the development of more effective and inclusive educational approaches. Through awareness of one's own body, more effective understanding and management of emotions are facilitated, aiding in the recognition of their physical manifestations (Conte et al., 2013).

With this article, we aim to provide, through the structuring of specific games and activities, a proposal for an intervention in both inclusive and interactive education within the spaces of Explora, the Children's Museum of Rome, thus promoting greater emotional and relational awareness in the child.

1. The role of inclusive education

Inclusive education is an educational approach that aims to promote the participation and success of all students, regardless of their individual differences, within the school context. Its main goal is to ensure that every student, regardless of their abilities, disabilities, cultural background, or other factors, can access quality education and fully develop their potential. Inclusive education is a key

objective of educational policies worldwide, and in Europe, most countries have made significant strides towards ensuring greater inclusivity in their educational systems (Buchner et al., 2020), allowing a growing number of individuals with disabilities to access and experience daily life with fewer limitations.

For a long time, people with disabilities were directed towards educational paths that separated them from the student population; in Austria, children with intellectual disabilities were labelled as incapable of attending school, resulting in denial of access to formal education (Buchner & Poyer, 2020). Fortunately, over the years, European states have developed different approaches aimed at achieving more inclusive education, and since 2007, many of them have signed the UNCRP, a document that mandates the construction of inclusive educational systems for all students.

A fundamental pillar of inclusive education is equity, which involves the adoption of differentiated and personalized teaching strategies to meet the individual needs of students and ensure equal opportunities for learning and success.

Furthermore, it promotes a collaborative and supportive learning environment where students are encouraged to work together and learn from each other. This fosters the development of social skills and interculturality, as well as creating a more cohesive school community.

Inclusive education is based on principles such as respect for diversity, acceptance of individual differences, and the promotion of student autonomy.

To support this complex process, it is argued that collaboration among stakeholders in the education of students with disabilities can lead to greater and better inclusion and academic success (Hargreaves et al., 2021; Vlcek et al., 2020).

In this perspective, collaborative action tied to a shared vision aimed at achieving greater inclusion and equal opportunities plays a fundamental role in promoting greater awareness in various life environments. Thus, a holistic approach, directed towards a user base that spans the entire developmental spectrum, and which links not only interventions in the educational but also the domestic and recreational spheres, can bring benefits in enhancing greater awareness of diversity. Inclusive education not only aims to create accessible and welcoming learning environments but also promotes an education that celebrates diversity and prepares students to live in an increasingly inclusive and interconnected society.

It follows that the implementation of interventions even in educational and recreational settings, beyond the more traditional school environment, can provide important support for promoting increased functional development (Fang et al., 2023; Smythe et al., 2024).

On the other hand, play is an essential part of the cognitive, social, and emotional development of all children. Ensuring play spaces that respect different needs and promote greater awareness of diversity is a significant support in promoting the achievement of a society that is increasingly inclusive and respectful of the needs of everyone.

Specifically, focusing on the structuring of environments and their organizational aspects can directly influence the implementation of problem behaviours (Olivier-Pijpers et al., 2020) by a user base facing greater difficulties, which are enacted in response to perceived experiences of hardship. Furthermore, the structuring of games and play environments that promote equal opportunities, using adaptive materials and respect for the inherent characteristics in the process of analysing multisensory stimuli, aligns with the goal of ensuring that all children have access to quality early childhood development, care, and pre-primary education by 2030, as outlined in the inclusion strategy promoted by UNICEF (Olusanya et al., 2023).

2. Play and museum environments to support learning

Since the 19th century, educators have increasingly recognized the invaluable role that museums play as dynamic spaces for informal learning. Museums serve as vibrant hubs where individuals of all ages, from young children to seasoned adults, can immerse themselves in an enriching exploration of various disciplines, including art, history, culture, and science. Through an array of visually captivating exhibits and tangible artifacts, museums offer visitors unparalleled opportunities to delve deeply into the depths of disciplinary knowledge, fostering not only a broader understanding but also a profound appreciation for the nuances of each subject. Moreover, these immersive experiences within museums are instrumental in igniting and nurturing the innate curiosity and passions of children, thereby shaping their future interests and aspirations (Zhou et al., 2022).

Informal learning settings have become an important educational front for the dissemination of historical heritage and the popularization of scientific understanding. These environments encompass a diverse array of public cultural institutions dedicated to science, history, and art education. Among them are museums focusing on natural history, science, and technology; planetariums offering cosmic exploration; historical museums delving into the past; art galleries showcasing creative expressions; zoos housing diverse wildlife; botanical gardens flourishing with botanical wonders; and aquariums unveiling the mysteries of marine life. Museum-based learning constitutes an educational approach rooted in real-world challenges, placing a strong emphasis on the process of inquiry (Xu et al., 2023).

In particular, Children's museums are interactive exhibition spaces designed specifically for children and their families in which the learning by doing approach (Dewey, 1916) plays a decisive role. These museums are designed to provide children with the opportunity to learn through exploration, hands-on experience, and interaction with the exhibits in a fun and stimulating environment (De Gasperis, 2023). Game-based learning (Plass et al., 2020) is in fact an educational strategy that uses games as a tool to provide engaging and meaningful learning experiences. By incorporating the dynamics of play into teaching processes, it is possible to produce the positive reinforcement inherent in games and exploit the possibility of error as a primary form of learning.

Research based on empirical evidence underscores the intricate interplay of personal, social, and environmental factors in shaping the learning experiences of museum visitors. Several studies (Foster et al., 2020; Franse et al., 2020) have delved deeply into the realm of personal factors that influence museum learning, ranging from the prior knowledge levels of parents to the nuanced personal characteristics and the financial resources available within families. Beyond the individual sphere, the social dimension emerges as a pivotal force in the museum learning landscape. Investigations into interpersonal interactions within museum settings (Krange et al., 2020; Shaby et al., 2019) have unveiled the profound impact of peer interactions, teacher engagement, and commentator discourse on the learning journey of visitors. These interactions serve as conduits for shared knowledge, differing perspectives, and collaborative exploration, amplifying the richness of the museum experience. Moreover, the physical and technological milieu within museums exerts its own influence on the learning process. Attention to the spatial arrangement of exhibited objects, the aesthetic appeal of their forms, the abundance or scarcity of displays, and the ambient setting of exhibition halls all play pivotal roles in shaping visitor engagement and comprehension. In tandem, the accessibility and functionality of museum facilities, coupled with the seamless integration of information technologies, contribute to a more immersive and enriching learning environment (Bunce, 2019; Hsu et al., 2018; Kim et al., 2020).

3. The role of technology in supporting learning in museum environments

Studies have delved into the use of technology within museum environments, examining the multifaceted relationship between technological integration, museum contexts, and learning outcomes. For example, researchers have investigated the incorporation of mobile devices equipped with interactive tour programs and scenario-based games during museum visits. Their findings highlight the transformative potential of such technological interventions in enhancing

various aspects of the learning process. Research conducted by Atwood-Blaine et al. (2019), Sugiura et al. (2019), and Uz Bilgin & Tokel (2019) has shown that these additional technological tools can lead to significant improvements in academic performance, foster positive learning attitudes, nurture a stronger sense of cultural identity, and spark deeper interest among learners.

The theoretical foundation of technology integration in museum learning is based on several conceptual models, such as: experiential learning, according to which students gain a deeper understanding of learning content when they deal with it first-hand in authentic contexts (Behrendt & Franklin, 2014); situated learning, which assumes that knowledge is best acquired and applied in the context in which it is relevant (Choi & Ahn, 2021); active learning, which emphasises the importance of students' active involvement in meaningful learning activities and subsequent reflection (Chiang et al. , 2021); and finally, multimedia learning theory, which emphasises the effectiveness of presenting information through a combination of text, audio and graphic illustrations to promote students' cognitive processing (Mayer, 2020).

By leveraging technology to combine multimedia content and provide interactive and engaging educational experiences, museums can support experiential and situated learning while encouraging active exploration and inquiry among visitors. Through these approaches, technology becomes a powerful tool for fostering meaning-making and understanding, ultimately enriching the museum learning experience.

4. The body's role in learning processes

The body, mind, and environment interact inseparably and dynamically within the context of learning, a complex and articulated process. It is essential to understand the active role of the individual immersed in a multisensory educational environment, where all senses are activated both remotely, such as sight, hearing, and smell, and directly, such as the skin, membranes, and muscles. According to Dewey (1961: 83), education should involve both the body and the spirit, emerging from a vital and active participation that engages all physical aspects of the individual.

Theories of Embodied Cognition argue that the brain is closely connected to the body during cognitive processes, and that learning occurs not only through the activation of neural networks but also through the interaction of the body with the surrounding environment (Ale et al., 2022). The absorption of knowledge thus occurs through an analysis of the surrounding environment, supported by the

spontaneous and natural activity of the child, and shaped by both perceptual experiences and bodily action (Kiefer et al., 2023).

From a very young age, the individual actively engages in understanding the surrounding world and integrating as part of a complex system of skills, learning strategies, and interpersonal relationships. In this context, the body plays a crucial role in the cognitive process, contributing to the construction and organization of knowledge (Lozada & Carro, 2016).

Therefore, the implementation of dynamic movements in space, while exploring social, familial, and school changes, contributes to the formation of culture, values, and rights. The peculiarity of children lies precisely in investigating and understanding the world through bodily interaction, through which they carry out mental operations of verification, confirmation, or refutation of their previous ideas (Oudgenoeg-Paz & Mulder, 2021).

An experiential learning approach allows the individual to process information more deeply, using the body as a tool to recognize, discover, delve into, reflect, and create new patterns (Maggi, 2020). This process is closely linked to how the body perceives and processes environmental stimuli.

Studies have shown that an educational environment that simultaneously engages the senses and encourages the child to actively participate in the learning process leads to an improvement in the quality of knowledge acquisition (Chierichetti & Tombolini, 2023). The body, recognized as an educational mediator, allows the individual to encounter specific sensory experiences and develop their own personal analysis of the surrounding world (Piccinno, 2019).

Adopting an active pedagogical approach places the child at the centre as the main protagonist, allowing them to build their own knowledge. The body, historically a mediator of knowledge, plays this role through movement, relation, and action (Maggi, 2021).

Therefore, body and movement take on essential importance in various aspects of individual development (Munafò, 2017).

Finally, it is crucial to consider the fundamental principles of embodied design methodologies, which encourage children to connect their sensory and bodily experiences in specific contexts. This type of design assesses the impact of the social and physical environment on children's sensory and motor experiences, aiming to enrich these experiences through appropriate technological solutions (Schaper et al., 2023).

5. Body awareness to support the development of emotional awareness

From the earliest stages of life, children are immersed in an environment rich with physical, emotional, social, and cognitive stimuli. When processed functionally and supported to meet individual needs, these stimuli lay solid foundations for the child's harmonious development.

In this complex process, the ability to understand and perceive oneself as distinct individuals from others comes to life; self-awareness thus becomes an essential and foundational part of personality. The development of the latter is supported by the succession and resolution of processes that delineate stages of growth; indeed, from birth, children begin to develop a rudimentary form of self-awareness through the gradual recognition of their own physical, emotional, and relational needs, learning to respond to them appropriately.

It has emerged that from the very early moments of life, children possess unique socio-cognitive abilities (Tommasello M., 2020), predisposing them to learning and understanding the importance of the social context and how interactions contribute to shaping their personality and modes of relating to themselves and others.

Furthermore, the concept of physical self, tied to a view of the body schema in action, is of great relevance in children's growth, as bodily awareness allows for the processing of multisensory information. The analysis and integration of these stimuli support the development of bodily perceptions and representations, which give shape and meaningful connections between limb arrangement, body position, movements, and visual experiences (Ahn, 2022).

In this complex conception, the role played by processes of emotional recognition and processing, conveyed from the early moments by the relationship with the caregiver, stands out as an active agent in the construction of their regulation; supporting the development of functional emotional awareness. In particular, early tactile experiences can have a crucial role in promoting self-other differentiation and the development of the bodily component; affective touch provides information from both inside the body (interoception) and outside (exteroception), playing a fundamental role in the development of bodily-emotional self-awareness (Longa et al., 2020; Mercuri et al., 2023).

It follows that the experience of the body and the recognition of the self are directly linked to a functional development of emotional skills (Tsur N. et al., 2016), as signals and sensations from the senses constitute a key source for explaining emotional experience. The ability to recognize, manage, and understand one's emotions and awareness of movements, sensations, physical states, and position in space respond to the two forms of awareness, emotional and bodily, which

interact and mutually influence each other, playing an important role in overall well-being.

To connect body and mind, individuals must first be aware of their own bodily experience which, if supported by positive processes and relationships, allows for the regulation of emotional processes, including the relationship between body, thoughts, and feelings (Price & Hooven 2018). Studies have shown a direct relationship between awareness of bodily development and understanding emotions from elementary school (Conte et al., 2013), examining how conscious expression of one's body can help recognize the physical manifestations of emotions, addressing them more effectively. Body practices can thus act as facilitators of emotional experience, catalysing and directing its focus, enriching its meaning, and providing subjective significance.

6. Research
6.1 Research hypothesis

The above scientific evidence emphasises how there is a direct relationship between awareness of one's bodily experience and the understanding of emotions, right from primary school (Conte et al., 2013). Body practices can therefore act as facilitators of emotional experience, directing its focus, enriching its meaning, and giving it subjective significance, the purpose of this research is to verify that the multisensory pathway, by offering experiences that favour the development of the body schema and allow for experiences that involve different sensory channels, increases children's emotional awareness, compared to those who do not perform it.

6.2 Method

The protocol will be carried out within Explora, the Children's Museum, located in Rome, a museum education space whose educational approach is based on the idea that museums are places rich in resources and opportunities for education and personal growth. This translates into providing engaging and meaningful experiences, within interactive spaces, for students of all ages. In museums, students are not merely passive spectators of exhibits, but active participants in exploring, experiencing, and interacting directly with what they see. The experience thus becomes an opportunity to learn through all the senses, stimulating curiosity, imagination, and creativity. The activities will be provided by means of playful-interactive supports that will allow greater usability, to comply with the facility's

policies focused on promoting the acquisition of skills through recreational-educational installations.

The entire protocol (Table 1) will be carried out by a maximum of three users at a time and will last approximately 15 minutes in total.

The study will be carried out by comparing two groups, an experimental group and a control group, consisting of child visitors aged between 6 and 10 years old. In a first phase, only the experimental group will receive a multisensory motor pathway consisting of different activities aimed at stimulating awareness of the body scheme, motor coordination and balance, and offering different sensory sensations, such as tactile and visual ones. In a second phase, both groups will receive an intervention, offered through an interactive video projector, aimed at enhancing the children's emotional recognition. The third phase will be dedicated to tests to verify the research hypothesis, comparing the results of the experimental group with those of the control group.

	First phase	**Second Phase**	**Third phase**
Experimental group	Multisensory pathway	Emotional recognition intervention	Testing phase
Control group	-	Emotional recognition intervention	Testing phase

Table 1 (Research protocol)

Regarding the first phase, the experimental group will perform a multisensory motor pathway that promotes children's direct interaction with the materials provided, aiming to develop motor coordination, tactile, auditory, and visual experiences; the goal is to promote greater body awareness and offer an engaging and positive experience. This path encourages direct interaction of the children with the following materials:

1. Sensory Brushes: designed to stimulate tactile senses, the sensory brushes create a conducive environment, encouraging spontaneous collaboration among children and laying the foundation for subsequent activities. Using sensory brushes, children are invited to participate in a tactile experience with the facilitator and peers, aiming to establish a positive relationship.

Special attention is paid to maintaining appropriate relational boundaries, creating an environment that fosters a sense of connection and comfort.

2. Modular Balancing Path: this path consists of 28 detachable pieces available in 6 different colours. These elements are designed to encourage children to move in a balanced and controlled manner to improve coordination and balance and increase body awareness. Additionally, they promote imagination and creativity, providing a foundation for a functional self-perception. This activity helps develop motor coordination, balance, spatial awareness, and a sense of one's body, all in a fun and interactive context.

3. Tactile Discs: the set includes 10 circular textured discs made of ultra-soft flexible silicone, commonly used as components in sensory paths designed to stimulate the sense of touch and promote body awareness. The discs feature various surfaces, including rough, smooth, knobby, or soft, each providing diversified tactile stimuli. These materials are designed to offer positive and enjoyable sensory experiences, contributing to the development of body awareness and motor skills. In the proposed activity, the 10 tactile discs are randomly placed on the floor to create a sensory map. Children are explained that, through this sensory adventure, they will explore different tactile sensations with the coloured discs. They are then encouraged to move freely, exploring the different surfaces of the discs with their feet or hands, and describing the tactile sensations experienced as they move from one disc to another. Finally, structured activities are proposed where children follow precise instructions, such as finding the roughest disc, the softest one, or the one with a particular type of relief. This activity aims to stimulate body awareness, tactile perception, and motor coordination through an interactive recreational experience.

4. Fibre Optics: using LED technology, fibre optics emit a brilliant sparkle of light along their entire length, presenting a wide range of vivid colours. These fibres are particularly suitable for learning activities related to cause and effect, colour recognition, and promoting communicative competence. In the context of the proposed activities, children will be invited to explore the fibres optics with their hands, having the opportunity to touch them, gently weave them, or simply observe the colour of the light, which can be chosen based on individual preferences. This activity aims to stimulate sensory awareness by integrating tactile stimulation with visual stimulation.

The second phase involves the use of an interactive projector, through which children have the opportunity to actively interact with the activities displayed on it. Specifically, in this research, both the control and experimental groups will be proposed an activity (shown in Figure 1) in which the children, once they understand the emotion conveyed by the stimulus face, will have to choose a likely social situation associated with that emotion. It is possible to indicate the response by actively moving on the video image projected on the floor, followed by automatic feedback regarding correctness (Figure 2).
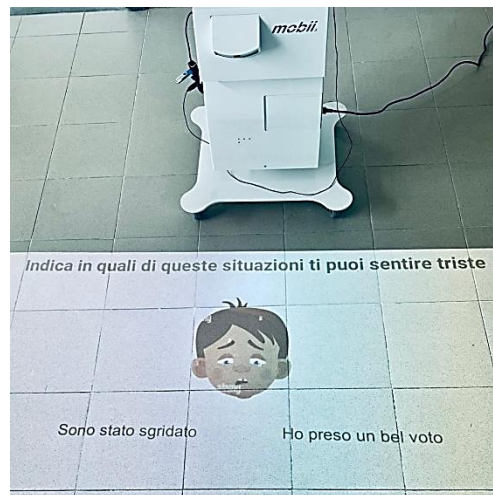

Figure 1. Intervention on emotional competence implemented by means of the interactive video projector

Figure 2. Interactive feedback regarding the correctness of the answer

6.3 Tools

The NEPSY-Second Edition is a series of tests designed to assess neuropsychological development in children from 3 to 16 years old. The areas investigated are diverse: motor skills, language, memory, attention, executive functions, visuospatial abilities, socio-emotional skills, reading abilities. It consists of a series of subtests covering these various areas, providing a detailed picture of the child's strengths and weaknesses.

In particular, Subtest S01.2 "Emotional Recognition", administered through the interactive video projector (as shown in Figure 3), will be used to evaluate the ability to recognize and understand emotional states by presenting a series of images of human faces expressing different emotions such as happiness, sadness, anger, fear, and disgust. This test helps assess the ability to interpret emotional signals, understand the nuances of facial expressions, and identify the appropriate emotion for social contexts. During the test, children are shown an image representing a specific social situation and then asked to select the picture, among the four options provided, that represents the appropriate emotional state.
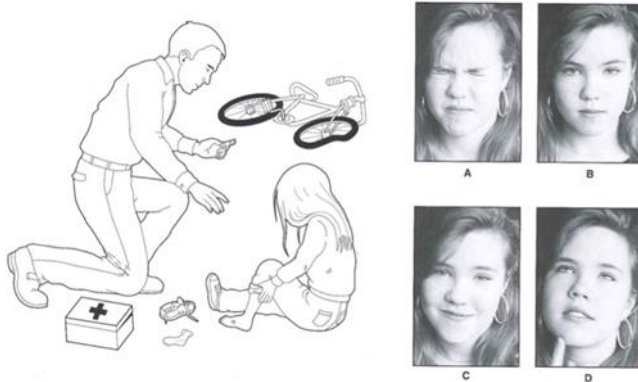
Figure 3. Subtest S01.2 "Emotional Recognition", administered through the interactive video projector

In addition, the Test of Emotion Comprehension (TEC), an instrument (Pons & Harris, 2000) for assessing children's understanding of emotions between the ages of 3 and 11, will also be administered using the interactive video projector. TEC refers to the basic skills of emotion recognition, understanding the impact of situations and beliefs on emotions. It measures nine components of emotion comprehension: (1) emotion recognition, (2) external cause, (3) desire, (4) belief, (5) reminder, (6) regulation, (7) hidden emotions, (8) mixed emotions and (9) morality-based emotions. It consists of 23 boards in a double version, with a male and a female protagonist. The upper part of the board represents a small story with emotional content, where the protagonist's face is left blank; while the lower part represents 4 different emotional expressions, from which the child is asked to choose the one that corresponds to the experience of the story's protagonist (Figure 4).
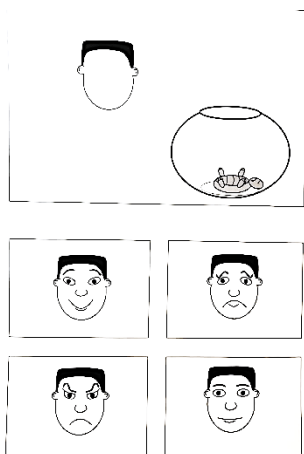
Figure 4. Test of Emotion Comprehension (TEC), administered through the interactive video projector

Conclusions

In conclusion, the presented model of research will aim to underscore a crucial connection between bodily awareness and emotional recognition. This study will delve into how multisensory experiences, particularly those that foster the development of body schema and engagement of various sensory stimulations, can enrich children's emotional awareness, specifically their ability to discern and recognise the emotions of others.

By conducting interventions within the dynamic and interactive context of Explora, the Children's Museum of Rome, this research seeks to provide immersive and meaningful experiences aimed at enhancing emotional recognition skills. Through a series of structured playful-interactive activities, including sensory brushes, modular balancing paths, tactile discs, and fibre optics, children are invited to embark on a journey of sensory exploration and motor skill development. Furthermore, the integration of an interactive projector adds an innovative dimension to the study, allowing children to actively participate in emotional recognition tasks and receive instantaneous feedback, thereby fostering a deeper understanding of emotional expressions and their contextual relevance. The NEPSY evaluation instruments, in particular Subtest S01.2 "Emotional Recognition", and the TEC will allow the effectiveness of the intervention to be measured, comparing the results of the experimental group with those of the control group. By assessing their ability to interpret facial expressions and discern appropriate emotional

responses within social contexts, this evaluation provides valuable insights into the developmental progress of the participants.

Therefore. by leveraging the engaging and immersive environment of Explora, along with innovative intervention strategies, this study aims to highlight the importance of bodily awareness in children to strengthen the skills necessary to navigate the complexity of their emotional landscapes and foster meaningful connections with others.

References

Ahn S., (2022), A Systematic Review of Interventions Related to Body Awareness in Childhood, nt. *J. Environ. Res. Public Health,* vol.19, n. 15., p. 8900, https://doi.org/10.3390/ijerph19158900

Ale M., Sturdee M., Rubegni E. (2022), A systematic survey on embodied cognition: 11 years of research in child–computer interaction, «International Journal of Child-Computer Interaction», vol. 33, 100478,ISSN 2212-8689, https://doi.org/10.1016/j.ijcci.2022.100478.

Atwood-Blaine, D., Rule, A. C., & Walker, J. (2019). Creative self-efficacy of children aged 9-14 in a science center using a situated Mobile game. *Thinking Skills and Creativity*, *33*, 100580.

Behrendt, M., & Franklin, T. (2014). A review of research on school field trips and their value in education. International Journal of Environmental & Science Education, 9(3), 235–245. https://doi.org/10.12973/ijese.2014.213a

Buchner T., Shevlin M., Donovan M., Gerke M., Goll H., šiška J., Janyšková K., Smogorzewska J., Szumski G., Vlachou A., Deo H., Feyerer E., Corby D., (2021), Same Progress for All? Inclusive Education, the United Nations Convention on the Rights of Persons With Disabilities and Students With Intellectual Disability in European Countries, Journal of Policy and Practice in Intellectual Disabilities, vol. 18, n. 1, pp-7-22 https://doi.org/10.1111/jppi.12368

Bunce, L. (2019). Still life? Children's understanding of the reality status of museum taxidermy. Journal of Experimental Child Psychology, 177, 197–210. https://doi.org/10.1016/j.jecp.2018.08.007

Chiang, C., Wells, P. K., & Xu, G. (2021). How does experiential learning encourage active learning in auditing education? Journal of Accounting Education, 54, https://doi.org/10.1016/j.jaccedu.2020.100713

Chierichetti C., Tombolini E. (2023), Digital multisensory storytelling as educational-didactic methodology, «Italian Journal of Health Education, Sports and Inclusive Didactics», 7(2), EUR, https://doi.org/10.32043/gsd.v7i2.890.

Choi, H.-G., & Ahn, S. H. (2021). Effects of a conflict resolution training program on nursing students: A quasi-experimental study based on the situated learning theory. Nurse Education Today, 103. https://doi.org/10.1016/j.nedt.2021.104951

Conte R., Candela M., D'anna C., Pastena N., Gomez Paloma F., (2013), A Pilot Study on the Role of Emotions through the Body in the Educational Context, *Procedia – Social and Behavioral* Sciences, vol. 106, pp. 181-190.

De Gasperis, P. (2023). Gioco, apprendimento e riuso digitale. Il museo come servizio. *DigItalia*, *18*(2), 85-91.

Dewey, J. (1916). Democrazia e educazione, trad. it. di E. E. Agnoletti e P. Paduano, La Nuova Italia, Milano, 2000

Dewey, J., (1961), Educazione oggi. Firenze: La Nuova Italia.

Diethelm J., (2019), Embodied Design Thinking, «She Ji: The Journal of Design, Economics, and Innovation», 5(1), pp. 44-54. ISSN 2405-8726, https://doi.org/10.1016/j.sheji.2019.02.001.

Fang Z., Liu X., Zhang C., Qiao D., (2023), Early childhood interventions in educational settings that promote school readiness for children with autism and other developmental disabilities: Systematic review, Research in Autism Spectrum Disorders, vol. 108, pp. 102257, https://doi.org/10.1016/j.rasd.2023.102257

Foster, S., Fillis, I., Lehman, K., & Wickham, M. (2020). Investigating the relationship between visitor location and motivations to attend a museum. Cultural Trends, 29(3), 213–233. https://doi.org/10.1080/09548963.2020.1782172

Franse, R. K., van Schijndel, T. J. P., & Raijmakers, M. E. J. (2020). Parental pre-knowledge enhances guidance during inquiry-based family learning in a museum context: An individual differences perspective. Frontiers in Psychology, 11, 1047–1047. https://doi.org/10.3389/fpsyg.2020.01047

Harreaves S., Holton S., Baxter R., Burgoyne K., (2021), Educational experiences of pupils with Down syndrome in the UK, Research in Developmental Disabilities, vol. 119, pp. 104115 https://doi.org/10.1016/j.ridd.2021.104115

Hsu, T., Liang, H., Chiou, C., & Tseng, J. C. R. (2018). Cobochild: A blended mobile game-based learning service for children in museum contexts. Data Technologies and Applications, 52(3), 294–312. https://doi.org/10.1108/DTA-05-2016-0042

Kiefer, M.; Hofmann, C.; Arndt P., (2023), Embodied cognition, in R.J. Tierney, F. Rizvi, K.Ercikan (Eds.), International Encyclopedia of Education (Fourth Edition), pp. 67-74, ISBN 9780128186299.

Kim, M., Dillon, J., & Song, J. (2020). The factors and features of museum fatigue in science centres felt by Korean students. Research in Science Education (Australasian Science Education Research Association, 50(2), 419–436. https://doi.org/10.1007/s11165-018-9695-x

Krange, I., Silseth, K., & Pierroux, P. (2020). Peers, teachers and guides: A study of three conditions for scaffolding conceptual learning in science centers. Cultural Studies of Science Education, 15(1), 241–263. https://doi.org/10.1007/s11422-018-9905-x

Longa L., Filippetti M., Dragovic D., Farroni T., (2020), Synchrony of Caresses: Does Affective Touch Help Infants to Detect Body-Related Visual–Tactile Synchrony?, Front. Psychol, vol. 10, https://doi.org/10.3389/fpsyg.2019.02944

Lozada, M. & Carro, N., (2016), L'azione incorporata migliora la cognizione nei bambini: prove da uno studio basato su compiti di conservazione piagetiani, «Davanti. Psicolo», 7(393). Doi: 10.3389/fpsyg.2016.00393.

Maggi, D. (2020), Un flusso in apprendimento, il Corpo, «Costellazione di pensieri», 13.

Maggi, D. (2021), Corpo, Educazione e Movimento: un apprendimento in azione e relazione, «Costellazione di pensieri», 15. Doi10.1285/i24995835v2021n15p54;

Mayer, R. E. (2020). Searching for the role of emotions in e-learning. Learning and Instruction, 70. https://doi.org/10.1016/j.learninstruc.2019.05.010.

Mercuri M., Pila D., De France K., Jean A., Fogel A., (2023), An intensive longitudinal investigation of maternal and infant touching patterns across context and throughout the first 9-months of life, Infant Mental Health Journal, vol. 44, n. 4, p. 495-512, https://doi.org/10.1002/imhj.22070

Munafò, C.; (2017), La valenza formativa dell'interazione corpo-movimento-ambiente di apprendimento, «Educare.it», 17(1), (rivista on line - ISSN: 2039-943X).

Olivier-Pijpers VC., Cramm JM., Nieboer AP., (2020), Cross-sectional investigation of relationships between the organisational environment and challenging behaviours in support services for residents with intellectual disabilities, *50Heliyon*, vol. 6, n.8, DOI:https://doi.org/10.1016/j.heliyon.2020.e04751

Olusanya B., Nair MKC., Smythe T., Wright S., Hadders-Algra M., (2023), UNICEF and global leadership for disability inclusion in early childhood, *The Lancet Child & Adolescent Health*, vol.7, n. 5, DOI:https://doi.org/10.1016/S2352-4642(23)00075-5

Oudgenoeg-Paz , O. & Mulder , H. (2021). Un approccio percezione-azione allo sviluppo precoce della cognizione spaziale: l'importanza dell'esplorazione attiva, «Enfance», 1, pp.37-50. https://doi.org/10.3917/enf2.211.0037.

Piccinno, M., (2019), Apprendere e comprendere, Pisa: ETS. S.L. Gronseth, E.M. Dalton (Eds.) (2020), Universal Access Through Inclusive Instructional Design, New York: Routledge.

Plass, J. L., Mayer, R. E., & Homer, B. D. (Eds.). (2020). Handbook of game-based learning. Mit Press.

Pricne C., Hooven C., (2018), Interoceptive Awareness Skills for Emotion Regulation: Theory and Approach of Mindful Awareness in Body-Oriented Therapy (MABT), Frontiers in Psychology, vol. 9, https://doi.org/10.3389/fpsyg.2018.00798.

Schaper M., Marquez Segura E., Malinverni L., Pares N. (2023), Think-4-EmCoDe framework: Highlighting key qualities in embodied co-design techniques for children, «International Journal of Human-Computer Studies», 177 (103065). ISSN 1071-5819, https://doi.org/10.1016/j.ijhcs.2023.103065.

Shaby, N., Ben, Z., Assaraf, O., & Tal, T. (2019). An examination of the interactions between museum educators and students on a school visit to science museum. Journal of Research in Science Teaching, 56(2), 211–239. https://doi.org/10.1002/tea.21476

Smythe T., Chen S., Rotenberg S., Unger M., Miner E., Sehers F. et al., (2024), Do children with disabilities have the same opportunities to play as children without disabilities? Evidence from the multiple indicator cluster surveys in 38 low and middle-income countries, *EClinicalMedicine*, vol 67, p. 102361, doi:https://doi.org/10.1016/j.eclinm.2023.102361

Sugiura, A., Kitama, T., Toyoura, M., & Mao, X. (2019). The use of augmented reality technology in medical specimen museum tours. *Anatomical sciences education*, *12*(5), 561-571.

Tommasello M., (2020), The adaptive origins of uniquely human sociality, Royal Society, https://doi.org/10.1098/rstb.2019.0493

Tsur N., Berkovitz N., Ginzburg K., (2016), Body Awareness, Emotional Clarity, and Authentic Behavior: The Moderating Role of Mindfulness, *Journal of Happiness Studies*, vol. 17 , pp. 1451-1472, https://doi.org/10.1007/s10902-015-9652-6

Uz Bilgin, C., & Tokel, S. T. (2019). Facilitating contextual vocabulary learning in a mobile-supported situated learning environment. *Journal of Educational Computing Research*, *57*(4), 930-953.

VLcek S., Somerton M., Rayner C., (2020), Collaborative Teams: Teachers, Parents, and Allied Health Professionals Supporting Students With Autism Spectrum Disorder in Mainstream Australian Schools, Australasian Journal of Special and Inclusive Education, vol. 44, n. 2, 104115 https://doi.org/10.1017/jsi.2020.11

Xu, W., Dai, T., Shen, Z., & Yao, Y. (2023). Effects of technology application on museum learning: a meta-analysis of 42 studies published between 2011 and 2021. Interactive learning environments, 31(7), 4589–4604. https://doi.org/10.1080/10494820.2021.1976803

Zhou, Y., Chen, J., & Wang, M. (2022). A meta-analytic review on incorporating virtual and augmented reality in museum learning. *Educational Research Review*, *36*. https://doi.org/10.1016/j.edurev.2022.100454