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Art Therapy for Children and Adults in the Context of Computer Use in Education and Neuropedagogy

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Abstract: The authors of the article focus on an interdisciplinary analysis of the possibilities of combining art therapy practices and digital technologies within the neuropedagogical educational context. The aim of the study is to conceptually substantiate a new model of psychocorrectional work termed "art polytherapy", which integrates sensory, cognitive, and affective components in a multimodal digital environment. The methodological basis of the study includes a theoretical-analytical review literature, the synthesis of practical experience, and educational-prognostic modelling methods. The findings emphasise the significance of digital media as an active factor in therapeutic interaction, ranging from sensory stimulation to emotional regulation. The article highlights the specific features of using such forms of art therapy as drawing therapy, vocal therapy, improvised theatre in VR format, as well as the use of AI algorithms and sensory mapping to individualise therapy. As a result, a step-by-step model of neuropedagogical art therapy was developed, taking into account the client's sensory profile, the selection of relevant media tools, and the monitoring of neurophysiological responses. The practical value of the study lies in establishing the groundwork for future experimental testing of the effectiveness of digital art therapy in working with children with special educational needs and adults experiencing psycho-emotional exhaustion. Thus, the article contributes to an innovative educational and therapeutic discourse at the intersection of neuroscience, art, and digital technologies.

Keywords: drawing therapy; vocal therapy; improvised theatre; performative practices; multichannel approach; functional-structural correlation; neuropedagogical intervention; simulation.

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1. Introduction

Modern education and art therapy within its context are undergoing a transformation that goes beyond classical cognitivism and moves towards a synthesis of emotional, sensory, aesthetic, and technological learning experiences (Rou Yap & Li Lee, 2024). In this context, art therapy appears not only as a psychotherapeutic practice but also as a neuro-pedagogical technology that activates the resources of brain plasticity, affective resonance, and symbolic thinking in a digital (and increasingly, virtual) environment. Therefore, it is proposed that the use of art therapy modalities such as drawing therapy, vocal therapy, dance therapy, or performative practices promotes deeper personalisation of the neuroeducational experience, unlocking the potential of children and adults through creative self-expression in a virtually empathetic environment supported by modern technological advancements, including AI.

Relevance of the article. Changes in the educational landscape, initially triggered by the pandemic and later by military-political factors, currently highlight the need for methods that combine psychological safety, emotional regulation, and personalised learning. Research shows that art-therapeutic approaches in a digital environment can enhance neuropsychological mechanisms of learning - particularly attention, memory, and self-regulation - through multichannel sensory activation (Malchiodi, 2020). We believe that the combined and individually tailored use of channel-specific expressive arts, such as vocal therapy (which influences autonomic regulation) and drawing therapy (used for the visual symbolisation and transformation of anxious experiences), holds particular promise. This is particularly relevant for sustained learning and psychological intervention in children with special educational needs and adults experiencing psycho-emotional exhaustion. This category may also include alternative forms of neuro-oriented art therapy, such as improvised theatre, sand therapy, and spontaneous dance (as a situational method of relieving affective tension).

Although art therapy in professional, private, and community settings is increasingly integrated with neurocognitive sciences, its potential applications through multichannel and simultaneous human-computer interaction remain understudied and insufficiently implemented.

A review of the relevant literature reveals several methodological and empirical studies, along with systematic reviews, that focus on almost all popular types of art therapy (drawing therapy, vocal therapy, music therapy, drama therapy, sand therapy, dance movement therapy, colour therapy, phototherapy, fairy tale therapy) (Malik, 2022; Lelaumier et al., 2025). Many of these studies provide valuable neurobiological and neuropsychological insights. Additionally, there is a wide range of professional and popular publications addressing private art therapy practices aimed at supporting functional (Kossak, 2021) and rehabilitative (Sajnani & Johnson, 2024) aspects of brain development, including approaches incorporating digital interfaces (Stretch, 2020). Unfortunately, insufficient attention has been paid to digital media tools that could not only facilitate the therapeutic process but also significantly enhance its effectiveness through adaptive algorithms, sensory interactivity, simulation, individualised visualisation, and adaptive environmental modulation. There is a distinct lack of integrated conceptual models that combine art-therapeutic performativity with real-time neurofeedback. In our view, this could facilitate highly precise and highly individualised psychocorrective interventions supported by digital technologies. Such collaborations could not only expand the toolkit of the modern art therapist but also transform the very paradigm of psycho-emotional interaction, making it more responsive to the cognitive characteristics of clients, particularly children with neurodevelopmental differences or adults with post-stress disorders. As a result, a new digital era of art therapy may emerge - one where the computer is not merely an auxiliary tool, but an active participant and facilitator in the neurotherapeutic process.

These challenges and perspectives have prompted us to explore the use of digital technologies in art-therapeutic practices and to develop a neuro-pedagogical model of “art polytherapy” for children and adults, which should be empirically validated in future studies. This constitutes the purpose of our article.

The methods employed to achieve this aim range from general theoretical approaches to specific practical procedures. They combine structural approaches (defining conceptual, correlational, and taxonomic relationships), a brief systemic analytical review of neuro-oriented and art-therapeutic practices in an integrated framework, and educational modelling and prognostic methods during the methodological development stage. The authors also conducted a small-scale pilot study to provide preliminary evidence regarding the effectiveness of the proposed model.

The article is theoretical and methodological in nature and is based on the assumption that the emerging approach should be systematically implemented within innovative neuroeducational settings, alongside the development of appropriate descriptive methodologies.

This approach should combine traditional art therapy practices (such as drawing therapy, vocal therapy, performative activities, fairy tale therapy, improvised theatre, sand therapy, and spontaneous dance) with digital technologies, forming a new synergistic model of psychological intervention within an open neuroeducational environment.

It considers the multimodality of sensory interaction (visual, auditory, tactile, motor) and is supported by recent studies showing that multimodal art-therapeutic interventions stimulate neuroplastic changes (Bokoch et al., 2025). For example, sand therapy, when used in a digital environment (through 3D scanning of sand structures), activates exteroceptive neural networks and deepens the process of symbolisation (Murakami et al., 2025). Similarly, improvised theatre in the context of VR or video-mediated communication, as demonstrated by Felsman and colleagues (2020), enhances artistic resonance and reduces social anxiety in participants while activating mechanisms associated with attention, emotional regulation, and body awareness. Likewise, the integration of fairy tale therapy and spontaneous dance into digital platforms not only reduces expressive barriers but also facilitates the creation of personalised symbolic narratives supported by artificial intelligence during the storytelling process (Bokoch et al., 2025).

These technological capabilities are crucial for therapeutic adaptability, as they allow real-time modulation of the sensory environment and personalisation of interaction channels and therapeutic presence, which are particularly important for children with developmental disorders and adults with traumatic experiences. Thus, the integration of digital tools into these traditional practices may become not merely an option but a methodological necessity for creating an inclusive, sensory, and individualised art-pedagogical environment in the era of hybrid education and neuroscience-informed learning.

International significance of the article. This article systematically examines the relationship between neuro-pedagogy and art therapy within the context of digital education, with a particular focus on innovative developments in the field. Existing theoretical frameworks have been further extended through the integration of the performative approach (Schechner, 2021), educational-therapeutic models employing vocal therapy as a mechanism of self-regulation in synchronous and asynchronous learning environments (Jo et al., 2024), and the development of a conceptual framework of neuroplastic goals, in which art-therapeutic techniques are viewed as tools for enhancing higher-order cognitive functions in digital learning (Rose & Dalton, 2009).

2. Research Ethics

All participants in the pilot study provided informed consent to participate. In the case of minors, consent was obtained from their parents or legal guardians. The authors ensured the protection of participants' data and maintained confidentiality throughout the study.

During participants' interaction with the digital environment, including multi-channel AI interfaces, measures were taken to prevent the disclosure of sensitive information. In addition, explainable AI approaches were used in the evaluation of initial data to enhance transparency and reduce the risk of unreliable results associated with "black-box" models.

3. Experience of Using Computer Technologies in Art Therapy Practices: Overview and Discussions

It is essential to begin with a discussion of the fundamental concepts and phenomena underlying brain-based education, art therapy, and digital technologies as both tools and environments within a neuro-oriented framework.

Within the emerging neuroeducational paradigm integrating art therapy and the digital environment, the therapeutic space evolves from a single-channel mode of interaction into a multimodal simulated environment. At the same time, multisensory perception of art symbols is of particular importance, including motor responses (spontaneous rhythm, dance). According to the study "Multisensory Digital Art Therapy and Autonomic Regulation: A Neuroaesthetic Perspective," published in *Frontiers in Psychology*, digital art stimulates functional neuroplasticity and network regulation by influencing the autonomic system, reducing anxiety, and enhancing emotional resilience (Strang, 2024).

Such digitally mediated art therapy may be effective not only for psychologically healthy individuals but also for those with specific perceptual styles or sensory sensitivities. At the very least, the availability of feedback makes it possible to regulate the quality and intensity of therapeutic intervention (Griffin et al., 2021). In this context, these approaches may be conceptualised as a set of expressive interventions delivered through adaptive interfaces that correspond to individual client profiles, facilitate empathic engagement, and, from a neurophysiological perspective, contribute to limbic system regulation (Strang, 2024). Altogether, such a model can create a multisensory digital continuum, allowing the dynamics of therapeutic intervention to be monitored and adapted in real time according to the user's individual profile.

Therefore, the combination of art therapy and the digital environment enables a shift beyond single-channel intervention: the therapeutic process evolves into a multisensory simulated continuum in which neural network integration is enhanced through the combination of visual, auditory, tactile, and performative stimuli, thereby expanding multimodal therapeutic practices (Hadjipanayi et al., 2023). Thus, any form of performative art therapy (visual, musical, or dance-based) combines externally structured therapeutic elements with client-driven spontaneity. Contemporary technologies also facilitate a form of neurocognitive integration between computer-based simulation capabilities and human neuroplasticity (Algarni, 2020). When these effects are considered collectively, simulation and improvisation appear to function as complementary dimensions of performative practice.

These mechanisms may modulate affective processes by promoting emotional regulation and stabilisation, thereby supporting innovative neuroeducational approaches to creativity (Yap & Lee, 2024; Hadjipanayi et al., 2023). Through the close integration of humans and technology, whereby digital systems support not only reproduction but also real-time creative collaboration, opportunities emerge for enhanced cognitive engagement within both individual and social psychoeducational contexts.

In neuro-oriented art therapy, it is also important to consider the mechanisms underlying performative practices—dynamic and interactive activities in which the individual simultaneously assumes the roles of creator, performer, observer, and reflective participant.

Performance embodies multisensory, improvisational, and simulated elements, integrating the physical body, virtual avatars, and interaction with audiences or technological systems.

Here, the advantages of body-oriented art-therapeutic practices become evident, as they may promote psychological integration more effectively than more static forms of engagement (such as passive listening or drawing) (Woycicki, 2021; Hadjipanayi et al., 2023). Therefore, it may be beneficial to transform various art forms into interoceptive and performative experiences whenever appropriate. In this context, participants engage not only in expressive processes but also in a holistic and immersive experience of artistic stimuli within the immediate therapeutic setting.

At the same time, programmable interfaces, due to their sensitivity, can regulate intensity, quality, channel selection, and the strength of excessive or insufficient stimulation. This opens new

horizons for therapy and learning, integrating affect with action, technology with the body, and creativity with neural reactivity.

After clarifying the relevant concepts, phenomena, and neural mechanisms, it is appropriate to adopt a structural-functional approach to present neuro-oriented art therapy methods within a broader synergistic framework (Figure 1).



Figure 1. Functional-Structural Correlation of Art Therapy, Neuropedagogy, and the Digital Environment

The block diagram visualises the relationships between the key concepts of the study—art therapy, neuro-pedagogy, the digital environment, and associated functional processes—within an integrated framework for psychoeducational interaction involving both children and adults. At the centre of this framework lies the concept of creative interaction, which emerges through the integration of multiple channels of influence and sensory stimulation.

Thus, for example, drawing therapy and vocal therapy, as forms of art practices, serve not only as tools for expression but also as means of activating neuroplastic processes, i.e., the modification of neural networks responsible for emotional regulation, adaptation, and learning.

Performative and improvisational aspects, in turn, create a dynamic experiential space in which individuals not only reflect but also actively construct and explore their identities within real or simulated environments, facilitated by the multimodal nature of digital technologies.

Within this framework, digital technologies function not merely as tools but as interactive partners capable of generating virtual representations of emotions, situations, and experiences in

real time, which, through feedback mechanisms, may enhance therapeutic and educational outcomes.

This contributes to closer integration between human and technological systems within emerging educational frameworks, where adaptive artificial intelligence algorithms support personalised and responsive learning and therapeutic environments capable of adapting to users' creative, emotional, and cognitive needs. Such a paradigm represents not merely a synthesis of methods but an expanded conceptual understanding of learning, therapy, and psychological adaptation based on neuroplasticity, emotional engagement, and multimodal participation. From an applied perspective, this approach may support the development of innovative intervention models for children on the autism spectrum and adults with PTSD, while also promoting creative thinking and self-regulation within digital educational environments.

4. Neuroeducational Model of “Art Polytherapy” for Children and Adults

Before proceeding with the methodological discussion, it is important to distinguish between performative and non-performative practices (although this distinction is often conditional, particularly when multiple forms of artistic expression are used simultaneously). Thus, performative art therapy practices, while they may formally use the same tools as other forms of art therapy (such as drawing therapy, vocal therapy, music therapy, drama therapy, dance-movement therapy, phototherapy, etc.), differ in the type of participation, the mode of interaction, and the level of the performer's engagement in the creative process. These differences have already been discussed from a neuropsychological perspective; however, an important methodological distinction should also be noted: while non-performative practices typically focus on the creation of a finished product (such as a drawing, song, or composition) as a mediator of emotional expression, performativity emphasises the process itself as an unfolding event characterised by improvisational, embodied, and affective components that are not always readily captured (Corsetti, 2021). It represents not merely a different form of performance but a transformation in the nature of participation itself: through performance, individuals not only express experiences but also actively reshape their role as agents within the creative process.

Importantly, performative practice involves the presence of a real or virtual “witness” (a live viewer, avatar, or AI), which alters the dynamics of responsibility, emotional response, and self-awareness. Thus, although drawing therapy and vocal therapy may include performative elements, they do not always rely on the performative event itself as the primary therapeutic mechanism. In a performance, the life-stage action itself becomes the mediator - not its result. Therefore, these practices are not identical. They are typologically distinct in terms of the depth of bodily involvement, modes of expression, interactivity, and their potential to facilitate psychological and somatic integration.

Let us now move closer to the issues of implementation. At the initial stage of neuroeducational art therapy in a digital environment, it is important to establish the client's personal sensory profile and identify channel-relevant art forms that optimise neuroactivation and support therapeutic effectiveness. For practical implementation, we propose three methodologically defined procedures:

4.1. Sensory Mapping Based on the ETC Method (Expressive Therapies Continuum, Hinz, 2019), adapted for digital contexts: the client is invited to choose among visual stimuli (digital drawing templates, VR interfaces), auditory fragments (music or vocal recordings), and interactive sensory actions (manipulating digital objects). This helps identify dominant levels—kinesthetic, perceptual-affective, or cognitive-symbolic—for subsequent therapeutic pathway customisation.

It should be noted that the sensory mapping phase, when supported by AI, can provide objective intermediate assessment data. AI can identify correlations between participants' sensory maps that are difficult to detect manually. Through multimodal interaction with digital interfaces, AI can: (a) detect psychologically relevant inconsistencies (e.g., the use of calm visual tones

combined with signs of motor tension or abrupt movements); and (b) identify patterns of synchronisation in behavioural responses (e.g., tempo, volume, and amplitude of vocal expression).

4.2. Digital Sensory Stress Test with Morph A Mood (MAM) – the client interacts with a personalised VR scenario and immediately assesses their emotional state via the MAM interface, which captures valence and arousal levels. This allows the therapist to adjust the performative or drawing session in real time (Norden, 2024).

4.3. AI-Assisted Performative Card – following the model “deck of cards + AI-generated image” (Shojaei et al., 2024), the client selects words or images that are subsequently transformed by AI into digital scenes.

All of these methods are based on the principle of multimodal stimulation—visual, auditory, motor, and creative-expressive—which, according to previous research (Hadjipanayi et al., 2023) and technological experiments involving VR art therapy (Yap & Lee, 2024), promotes neural integration and supports emotional regulation. The outcome of the initial assessment phase should be a profile of relevant sensory channels and preferences to guide subsequent personalised digital art therapy interventions (including drawing therapy, vocal therapy, or performative VR improvisation). This establishes the methodological foundation for subsequent therapeutic or group-based interventions and lays the groundwork for personalised neuroeducational support. This process may be more effective when guided by a systematic understanding of the relationships between interaction channels, specific forms of art therapy, and digital software (see Table 1).

At the same time, the methodological and technical criteria for selecting the software listed in the table included interface accessibility, the possibility of individual choice among several programmes within a single type of therapy, and the ability of the software to provide feedback. This feedback could take the form of automated assessment, a completed artistic product, or professional evaluation by a neuroeducator or art therapist.

Table 1. Neuroeducational Forms of Digital Art Therapy, Interaction Channels, and Software

Type of Art / Therapy	Creative Interaction (Client Action)	Neuroeducational Commentary	Software
Drawing Therapy	Draws on a tablet / PC, creates abstract images	Activates the visual cortex, develops imaginative thinking	Autodesk SketchBook, ArtRage, Krita
Vocal Therapy	Sings, expresses emotions vocally, improvises	Stimulates the limbic system, reduces anxiety, enhances emotional expression	VoCo Vocal Coach, GarageBand, Soundtrap
Colour Therapy	Evaluates colour palettes, changes colours	Modulates psycho-emotional state through colour patterns	iColor Therapy App, Adobe Color, Chromatherapy VR
Music Therapy	Listens to music, creates musical compositions	Improves cognitive flexibility, evokes emotional resonance	Brain.fm, Chrome Music Lab, Soundation
VR Art Therapy	Interacts with digital 3D environments	Engages multisensory brain areas, promotes neuroplasticity	Tilt Brush, Oculus Quill, OpenBrush
Dance / Performative Therapy	Moves in front of a camera or in a VR space	Develops bodily awareness, activates motor and emotional coordination	Just Dance Now, VR Dance Experience, MoveXR

The table was developed on the basis of a systematic review of neuroeducation sources and expert evaluation conducted by the authors.

The table demonstrates that different forms of art therapy are associated with distinct modes of digital mediation and are classified by means of creative interaction and validated from the perspective of neuroeducational influence and psychophysiological effectiveness. The table illustrates how different forms of art therapy may be associated with distinct modes of digital mediation and can be categorised according to creative interaction, neuroeducational relevance, and potential psychophysiological implications. The central conceptual principle of this framework is sensory multimodality, which engages multiple brain regions and promotes neuroplastic processes related to emotional regulation, creativity, social cognition, and bodily awareness.

This approach aligns with the findings of Hadjipanayi et al. (2023) and Yap and Lee (2024), among others, which support these relationships. These and related findings suggest positive associations between simulation-based art techniques and sensorimotor engagement, as well as between interactive virtual formats and performative engagement (Zull, 2023; Tokuhama-Espinosa, 2010).

Potential limitations in the use of VR techniques should be acknowledged. For example, their multimodal and complex sensory impact may cause adverse psychological effects in highly sensitive individuals and participants with sensory processing disorders (e.g., motion sickness or sensory overstimulation). Therefore, it is recommended to assess the accessibility of the proposed digital art therapy for participants prior to its implementation.

Based on the reviewed evidence, analytical discussion, and methodological synthesis, an educational modelling approach and prognostic framework can be used to propose a neuro-oriented digital art therapy model organised as a step-by-step therapeutic process:

1. Profiling of Neurosensory Responsiveness (Diagnostic Stage)

The client (child or adult) undergoes multimodal screening involving rapid assessment of responses to visual (colours, images), auditory (voices, music), motor (virtual movements), and performative stimuli. Adapted VR modules and questionnaires are used. The results generate a sensory engagement profile that identifies priority channels for therapeutic intervention.

2. Individualisation and Profiling (Targeted Intervention)

Data on individual sensitivity patterns and personal preferences in art forms can be taken into account when selecting the primary type of art-therapeutic intervention and specific practices. In this context, various combinations are possible, such as music therapy combined with dance or drawing therapy integrated with augmented reality, among others.

3. Interactive Session in a Digital Environment (Performative Improvisation)

The client interacts with the chosen environment or programme. This may be a VR performance, the improvisational creation of vocal/visual content, or a combination of several modalities. The primary aim is to promote alignment between emotional processes and creative activity, thereby enhancing therapeutic outcomes and self-regulation.

4. Neurofeedback and Self-Reflection (Evaluation and Dynamics)

After the session, both subjective assessments (questionnaires, interpretation of artistic artefacts, and evaluation of bodily sensations through emotional mapping) and objective assessments (including the potential use of biofeedback or neurophysiological monitoring systems) are conducted. This helps determine the level of engagement, emotional processing, and cognitive activation.

5. Integration into Psychological and Pedagogical Practices

The described art-therapeutic practices can be implemented as modules of augmented or blended learning and incorporated into personalised psychotherapeutic interventions. This approach enables the neuropedagogue to design an integrative, neuroeducational, and individualised programme for the client (learner). Thus, a neuroeducational trajectory is formed, grounded in the principles of personalisation, sensory interaction, and simulated creativity.

Even at this pre-experimental stage, the key elements include identifying the client's sensory profile, selecting the most appropriate therapeutic modalities and VR-based digital tools, and establishing a structured pathway for individualised psychological intervention.

6. Preliminary Evaluation of Model Effectiveness

The art polytherapy model presented in this article will be further tested in larger-scale neuroeducation projects. To provide initial evidence of its effectiveness, a small-scale pilot study was conducted.

A total of 20 participants were involved, including 10 adults and 10 children experiencing signs of emotional burnout in educational settings. A three-stage measurement procedure was implemented across a short observational period. Neurophysiological indicators (neuromarkers) associated with emotional regulation were recorded before, during, and after participation in the art polytherapy session.

The intervention included digital art therapy, music and vocal improvisation therapy, and performative collaboration in a virtual reality (VR) environment. In collaboration with neurophysiologists, the research team employed physiological monitoring methods, including: (a) heart rate variability; (b) skin conductance; and (c) EEG frequency band measurements.

It was hypothesised that, in addition to subjective changes, art polytherapy would produce measurable physiological responses. Quantitative results and brief interpretations are presented in Table 2.

Table 2. Changes in neurophysiological parameters during the pilot study of the proposed multimodal art therapy model

Neuromarkers	Average indicator before session	Average indicator during session	Average indicator after session	Neuroscientific interpretation
Heart rate variability (ms²)	411	519	558	The increase in heart rate variability reflects parasympathetic adaptation of the nervous system as self-regulation during creative tension–release.
Skin conductance (μS)	5.7	6.3	5.0	Electrodermal activity initially increases and then decreases, indicating adaptation of sensory activity.
Specific EEG ranges (μV²)				
Alpha rhythm	18.5	24.2	22.9	Stabilisation of the alpha rhythm by the end of sessions indicates emotional stabilisation against the background of internal locus of control.
Theta rhythm	11.0	15.9	14.0	This activity corresponds to creative reflection with subsequent integration of sensory experience.
Correlation index	0.17	0.33	0.38	This activity corresponds to creative reflection with subsequent integration of sensory experience.

Source: The authors' own conception

If the presented indicators are generalised, an increase in heart rate variability can be observed, correlating with parasympathetic activation from the middle of the art therapy session onwards. This reflects an adaptive response of the parasympathetic nervous system. In contrast, skin conductance increased during the intervention and decreased following the session, suggesting adaptive psycho-emotional regulation. Spectral analysis revealed a temporary

increase in alpha and theta activity during the intervention. This can be interpreted as enhanced creative activity and emotional-reflective integration at the middle stage of art polytherapy, followed by relaxation and a sense of emotional satisfaction.

The observed patterns suggest a possible association between physiological indicators and psychological processes during multimodal art therapy.

This therapy may support neural and psychological integration during performative activity in digital environments. The physiological measurements suggest a transition from heightened arousal towards emotional regulation and adaptive engagement.

However, the presented data are based on a preliminary empirical study conducted over a short longitudinal period. The aim of this study was to provide an initial demonstration of the effectiveness of the proposed model. Further large-scale empirical validation is required. Improvised performative creative practices in synergy with the digital environment and its interface systems require broader implementation and more detailed investigation.

7. Conclusion

An analysis of academic literature, existing practices, and trends identified in open sources suggests that the foundations are being established for a new model of neuroeducational and psychological support for children and adults within digitally mediated creative environments. Against the backdrop of global uncertainty and constant cognitive-emotional pressure, the need for innovative approaches to psycho-emotional support within the educational process is growing. Art therapy, as a field integrating creative self-expression, psychological stabilisation, and neuroeducational modelling, appears particularly relevant in this context. Its ability to work simultaneously with affective, cognitive, and sensory domains grants it special value when working with children and adults in stress-inducing environments. Moreover, the flexibility of digital media may make this form of therapy more accessible, personalised, and informed by neuroscientific principles.

The review of digital art therapy practices and the use of computer technologies in art-therapeutic processes highlights emerging methodological opportunities, ranging from VR-based scenarios to AI-generated visual stimuli. The advantage of such approaches lies in the ability to tailor the intensity, rhythm, and mode of intervention according to the participant's neuropsychological profile.

The uniqueness of digital modalities lies in their capacity to create safe yet stimulating environments in which participants not only respond to experiences but also actively shape their emotional and cognitive engagement. While the balance between technological mediation and live interpersonal contact remains a matter of discussion, existing practice demonstrates that hybrid formats can effectively integrate both elements.

The proposed model of "art polytherapy" offers a framework for educational-therapeutic interaction in which the integration of multimodal channels of self-expression—drawing, vocalisation, movement, narrative, and interaction with digital imagery—plays a central role. The central element of this model is sensory-cognitive profiling of the client (child or adult), allowing the selection of the most relevant tools for individual or group work. The use of adaptive digital platforms, artificial intelligence, and VR components within the model enables real-time modification of therapeutic environments, potentially supporting neuroplasticity, emotional regulation, and cognitive flexibility—resources that are particularly important during periods of crisis and change. A small-scale empirical pilot study involving a limited number of participants yielded encouraging preliminary findings, suggesting the potential effectiveness of the proposed multimodal art therapy model.

Research Perspectives.

As this article is educational-philosophical and theoretical-methodological in nature, its findings should be further developed through empirical and reproducible research designed to evaluate the proposed concepts, theoretical assumptions, and methods.

References

- Algarni, A. (2020). Neuroscience of creativity in human–computer interaction. In M. Garneli, R. B. Gomes, & M. J. McGlynn (Eds.), *Future Technologies Conference 2019: Advances in Intelligent Systems and Computing* (Vol. 1042, pp. 248–262). Springer. https://doi.org/10.1007/978-3-030-32520-6_20
- Bokoch, R., Hass-Cohen, N., Espinoza, A., O'Reilly, T., & Levi, E. (2025). A scoping review of integrated arts therapies and neuroscience research. *Frontiers in Psychology, 16*, 1569609. <https://doi.org/10.3389/fpsyg.2025.1569609>
- Corsetti, J. (2021). *Bringing the body into art therapy: The use of touch and body awareness in creative healing* (Master's thesis, Lesley University). Lesley University Digital Commons. https://digitalcommons.lesley.edu/expressive_theses/473
- Felsman, P., Gunawardena, S., & Seifert, C. M. (2020). Improv experience promotes divergent thinking, uncertainty tolerance, and affective well-being. *Thinking Skills and Creativity, 35*, 100632. <https://doi.org/10.1016/j.tsc.2020.100632>
- Griffin, C., Fenner, P., Landorf, K. B., & Cotchett, M. (2021). Effectiveness of art therapy for people with eating disorders: A mixed methods systematic review. *The Arts in Psychotherapy, 76*, 101859. <https://doi.org/10.1016/j.aip.2021.101859>
- Hadjipanayi, C., Banakou, D., & Michael-Grigoriou, D. (2023). Art as therapy in virtual reality: A scoping review. *Frontiers in Virtual Reality, 4*, 1065863. <https://doi.org/10.3389/frvir.2023.1065863>
- Hinz, L. D. (2019). *Expressive therapies continuum: A framework for using art in therapy*. Routledge.
- Jo, H. J., Park, C., Lee, E., Lee, J. H., Kim, J., Han, S., Kim, J., Kim, E. J., Kim, E., & Kim, J. J. (2024). Neural effects of one's own voice on self-talk for emotion regulation. *Brain Sciences, 14*(7), 637. <https://doi.org/10.3390/brainsci14070637>
- Kossak, M. (2021). *Attunement in expressive art therapy: Toward an understanding of embodied empathy*. Charles C Thomas Publisher.
- Lelaumier, C., Hassaïni, S., Hinault, T., Petroff, A., Platel, H., & Coello, Y. (2025). Sound-based rehabilitation of unilateral spatial neglect: A systematic review of the literature. *Applied Neuropsychology: Adult, 1*–18. <https://doi.org/10.1080/23279095.2025.2459805>
- Malchiodi, C. A. (2020). *Trauma and expressive arts therapy: Brain, body, and imagination in the healing process*. Guilford Publications.
- Malik, S. (2022). Using neuroscience to explore creative media in art therapy: A systematic narrative review. *International Journal of Art Therapy, 27*(2), 48–60. <https://doi.org/10.1080/17454832.2021.1998165>
- Murakami, S., Hasegawa, K., Takatori, S., Adachi, M., Li, L., Kato, C., & Tanaka, S. (2025). Visualization of 3D scanned data to support sandplay therapy. *Journal of Visualization, 28*, 807–818. <https://doi.org/10.1007/s12650-025-01062-9>
- Norden, M. (2024). *A novel approach to inducing and measuring acute stress responses: Development, evaluation and application potential of a digital stress test* (Doctoral dissertation).
- Rose, D. H., & Dalton, B. (2009). Learning to read in the digital age. *Mind, Brain, and Education, 3*(2), 74–83. <https://doi.org/10.1111/j.1751-228X.2009.01057.x>
- Rou Yap, Y., & Li Lee, Y. (2024). *Break times: Virtual reality art therapy*. arXiv. <https://doi.org/10.48550/arXiv.2411.05146>
- Sajnani, N., & Johnson, D. R. (2024). *Trauma-informed drama therapy: Transforming clinics, classrooms, and communities*. Charles C Thomas Publisher.
- Schechner, R. (2021). *Performance studies: An introduction* (4th ed.). Routledge.
- Shojaei, F., Shojaei, F., Torres, J. O., & Shih, P. C. (2024). Insights from art therapists on using AI-generated art in art therapy: Mixed methods study. *JMIR Formative Research, 8*, e63038. <https://doi.org/10.2196/63038>

- Strang, C. E. (2024). Art therapy and neuroscience: Evidence, limits, and myths. *Frontiers in Psychology*, 15, Article 1484481. <https://doi.org/10.3389/fpsyg.2024.1484481>
- Stretch, C. (2020). The handbook of art therapy and digital technology (Manuel d'art-thérapie et de technologie numérique) edited by C. Malchiodi [Book review]. *International Journal of Art Therapy*. <https://doi.org/10.1080/26907240.2020.1844468>
- Tokuhamma-Espinosa, T. (2010). *Mind, brain, and education science: A comprehensive guide to the new brain-based teaching*. W. W. Norton & Company.
- Woycicki, P. (2021). Interoceptive dramaturgies of 'surrogate-selves' in performative VR experiences. *Performance Research*, 26(3), 17–25. <https://doi.org/10.1080/13528165.2021.1977492>
- Yap, Y. R., & Lee, Y. L. (2024). *Break times: Virtual reality art therapy* [Preprint]. *arXiv*. <https://doi.org/10.48550/arXiv.2411.05146>
- Zull, J. E. (2023). *The art of changing the brain: Enriching the practice of teaching by exploring the biology of learning*. Routledge.