

Embodied Creativity: An experimental school laboratory on movement to promote the educational development of students with SLD

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Abstract

The concept of creativity identified as a mental construct, in recent years, has seen an evolution towards an embodied vision of creativity. The body and movement take on a fundamental role as an educational and inclusive tool for relating to others, for exploring the environment and as a generator of ideas and mental abilities. In this regard, the aim of this research was to propose a creative dance school laboratory for students with Specific Learning Disorders (SLD) and evaluate its effectiveness in the development of fundamental personal skills. The Questionnaire on Mental Abilities second version (QuAM 2) was used as an evaluation tool and the results allowed us to appreciate the goodness of the educational proposal and to propose interesting considerations for the stakeholders of teaching and special pedagogy.

Keywords: Embodied Creativity, Creativity Dance, Educational Laboratory, Educational Skills, Specific Learning Disorders (SLD).

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Introduction

Throughout their lifespan, individuals undergo continual transformations

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Il Paper è frutto di un lavoro congiunto degli Autori. Nello specifico a Davide Di Palma sono da attribuire le seguenti parti: “Research Structure: Method, Sample, Educational Protocol and Evaluation Tools” – “Results” – “Discussion and concluding remarks”; all’Autrice Maria Giovanna Tafuri: “Introduction” – “Analysis of the process of transition from the concept of cognitive creativity to embodied creativity”.

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in their environment, necessitating the utilization of problem-solving abilities for successful adjustment. An essential attribute that plays a crucial role in navigating various challenges is creativity, which enables the generation of diverse problem-solving strategies. The concept of creativity often pertains to the articulation of thoughts and the creation of inventive problem resolutions (Guilford, 1956). Creativity has historically been defined as the collection of mental processes that support the activities of perception, intuition, innovation, ideation, problem-solving, and critical thinking. An extensive literature shows that creativity involves not only the cognitive and metacognitive aspects, but also the emotional and affective aspects (Beaty et al., 2016; Demarin et al., 2016). However, the concept of creativity has taken on a different meaning over time. Indeed, in line with the paradigm of embodied cognition, scientific evidence shows that creativity is strongly associated with bodily experience (Adams, 2010; Beaty & Kenett, 2023; Frith et al., 2019; Glorioso et al., 2024; Oppici et al., 2020; Vaisvaser, 2021).

The correlation between creativity and physical movement has been a focal point of inquiry for numerous researchers. This exploration has led to the proliferation of the notion of embodied creativity, which pertains to the capacity to manifest and convey creativity using the human body. Within the framework of embodied creativity, the body and its movement assume a key role in the development of creative thoughts (Culshaw, 2023; Malinin, 2019; Stanciu, 2015). In this view, from a top-down conceptualization of creativity, to be understood as a cognitive process that first arises in the mind and then expresses itself through behaviour, we move to a bottom-up conceptualization, according to which mind and body are closely associated and creativity is embodied since it arises from the body, its relationship with the environment and is expressed through the body, giving rise to creative movement. The perception of self and body in the environment provides the opportunity to explore different alternatives to solve a problem, therefore the promotion of creative movement contributes to the development of creative ideas. This is equally valid when we are faced with school-age children with specific learning disorders; indeed, in this case creativity takes on an even more important role in the educational development of these individuals and supports them in the learning and problem-solving phases (Grasselli et al., Magenes et al., 2022; 2015; Peter, 2015; Reisman & Severino, 2020).

To this end, the framework of creative movement is proposed in this study to explore and understand the development of creative, imaginative and different mental abilities in developmental age. Sense-motor experience enables the planning of useful strategies for understanding and living effectively in one's surroundings, which enables the generation of new ideas

and the acquisition of skill (Frith et al., 2019; Serra et al., 2021). This denotes how relevant is the study of the development of creativity, in a formative, inclusive and educational dimension, through the body in developmental age.

The purpose of this contribution is to analyze the effects of an innovative educational integration, based on a creative dance laboratory, implemented in addition to the traditional training offer on a group of students with mild SLD, to encourage the development of creative and mental skills in inclusive school environments through creative movement.

Analysis of the process of transition from the concept of cognitive creativity to embodied creativity

The phenomenon of creativity is often depicted through various interpretations, commonly recognized as a mechanism beneficial in producing an outcome, such as an innovative concept, a notion, or a fresh and practical mental framework, aimed at enhancing the overall well-being of the person. Creativity has always been understood as a cognitive and mental process, generated from internal inputs following a process of focusing thoughts inward and independent of external inputs (Demarin et al., 2016; Frith & Loprinzi, 2018; Sawyer, 2011).

Several neuroscientific studies have been dedicated to comprehending the underlying neurophysiological foundation of the creative process. Throughout the years, theories regarding the specialization of the cerebral hemispheres have been suggested, such as the notion that the right hemisphere is associated with creativity and art, despite the lack of empirical evidence. This proposition is rooted in the belief that the right hemisphere plays a role in visuo-spatial tasks, suggesting that artists possess enhanced visuo-spatial capabilities; furthermore, art, which is the product of creativity, identified as a non-verbal ability, could not be attributed to the left hemisphere, which is responsible for the control and processing of language (Zaidel, 2013). All this makes us realise how difficult it is to study the genesis of creativity. However, current neuroscience is investigating the association between creative thinking and the associated structural and functional changes in the brain, and two networks are mainly being investigated: the default network and the control network (Beaty et al., 2016; Fink et al., 2007; Ludvik, 2023; Mastroia, Agnoli & Corazza, 2021; McMillan et al., 2013). The default network is associated with spontaneous thinking and autobiographical retrieval. In contrast, the control network is associated with cognitive processes that require externally directed attention, including working memory and task resolution. Although there is scientific evidence

indicating an antagonistic relationship between the two networks, they have also demonstrated collaboration in various cognitive tasks, especially in the regulation of self-generated information from a higher level. Therefore, the process of creative thinking can gain advantages from the dynamic interplay of these networks, with this interaction likely relying on similar neural mechanisms. Specifically, studies using neuroimaging techniques have explored the connection between these two networks by analyzing the impact of music, writing, and observing artistic creations, revealing that both networks work together to utilize both higher-level regulation and lower-level sensory input during the process of creative thinking (Arden et al., 2010; von Thienen, Kolodny & Meinel, 2023).

The concept of creativity often implies a focus on the production of novel concepts, suggesting a cognitive activity distinct from physical embodiment and lived encounters. Action, movement and bodily experience of the environment is understood simply as the expression of the mental creative process (Vaisvaser, 2021).

However, thanks to new studies on the mind-body relationship, the concept of embodied creativity is emerging according to which ideas are not generated exclusively by a cognitive system but are generated by and through the body and its movement. Creativity is no longer understood as a cognitive construct but becomes an innovative and functional action, where the body becomes a tool for exploring the surrounding environment, generating innovative thinking and creative solutions to problems (Frith, Miller & Loprinzi, 2020; Orth et al., 2017, Stanciu, 2015).

The significance of physical activity in the enhancement of cognitive skills during childhood is extensively acknowledged. Empirical research indicates that educational interventions incorporating movement facilitate cognitive development in young children more effectively than sedentary methods, thereby enhancing the process of idea generation (Frith et al., 2019; Pica, 2009; Rigon et al., 2024; Serra et al., 2021; Zocca, Garofalo & Vecchio, 2004). According to a dynamic ecological approach, movement generates from the continuous interaction of perception, cognition and action; however, one must consider that creative movement emerges from the exploration of new actions. Therefore, the more an environment is enriched, the greater the possibilities for an individual to experience new actions.

Although the link between movement and cognitive creativity is a relatively recent topic, within the framework of embodied creativity one should emphasise the importance of designing environments that offer new possibilities and allow individuals to explore how they can effectively generate creative movement. Considering the importance of creativity in various contexts, this approach could have a positive impact not only on the

physical aspect but also on creative cognition, especially for kids with SLD. In these subjects, starting the stimulus of creative thinking immediately through movement and training it over time will be able to support them in all future challenges of life. It seems clear that this topic must become an important educational objective of the school system.

Research Structure: Method, Sample, Educational Protocol and Evaluation Tools

The experimental protocol consisted of evaluating the effects of performing arts, and in particular creative dance, on the development of mental and creative skills on subjects with mild SLD. Twenty school children aged between 8 and 15 years, with a declaration of mild SLD formally filed in the school administrative offices, were involved; 10 students were involved in the extracurricular didactic project (experimental group) and 10 students, who were not involved in any activities other than school, were recruited as a control group and were only subjected to the evaluation process.

The extra-curricular project was developed in 3 months with 8 monthly meetings of one hour each for a total of 24 hours, during which the students in the experimental group were performed the creative dance workshops. Before starting the project, we ensured that the students in the experimental group did not engage in any extracurricular activities other than the workshop. At the beginning and at the end of the project, the students, both those of the sample group and the control group, underwent an assessment of their mental abilities by means of the Mental Ability Questionnaire version 2 (QuAM 2) also valid for subjects with SLD. To evaluate the possible effects induced by the laboratory on mental abilities, the ex-ante and ex-post results of the questionnaires carried out by the students of the experimental group and the control group were compared with each other.

The Questionnaire on Mental Abilities second version (QuAM 2), a test examining 8 different constructs: self-esteem as an athlete, management of competitive anxiety, ability to pay attention, imaginative ability, degree of motivation for sporting activity, degree of assertiveness or aggressiveness, stress management and the presence of goals to be pursued in competition. The Mental Skills Questionnaire consists of 48 items and the total filling-in time is 20 minutes, to which an additional time of 6 minutes was added (+ 30%) given that they were students with SLD for a total of 26 minutes. After collecting the data from the QUAM 2 test of both recruited groups, the mean,

standard deviation, median and minimum and maximum value of the factors assessed in the QUAM test were calculated with their respective ratings.

Results

From the analysis of the data, we obtained statistically significant differences in the mental abilities, assessed by means of the QUAM test, both in the intragroup values measured at the beginning and at the end of the educational planning in the experimental group, and in the experimental group compared to the control group. Specifically, the following tables shows the data of the students in the experimental and control group. We point out that, in a qualitative evaluation, a result of average value of the analyzed item between 6 and 10,4 is a poor value, between 10,5 and 14 is very low, between 14,1 and 16,9 is relatively low, between 17 and 20,9 is fair, between 21 and 25 is good, and between 26 and 30 is excellent.

Tab. 1- QUAM test of the students in the experimental group - ex-ante

ITEM	1	2	3	4	5	6	7	8	9	10
<i>Self-esteem</i>	18	20	15	20	19	14	23	18	9	14
<i>Anxiety Management</i>	16	10	13	13	10	13	18	12	20	16
<i>Attention</i>	18	17	17	17	13	10	19	19	14	20
<i>Imagination</i>	18	15	15	14	18	8	15	20	8	10
<i>Motivation</i>	19	19	16	20	20	10	20	18	14	13
<i>Assertiveness</i>	15	17	12	10	12	10	16	11	11	11
<i>Stress Management</i>	20	17	19	10	20	10	20	20	16	16
<i>Focus on Goal</i>	19	21	13	18	15	10	15	16	5	15

Tab. 2 - QUAM test of the students in the experimental group - ex-post

ITEM	1	2	3	4	5	6	7	8	9	10
<i>Self-esteem</i>	25	29	20	28	26	18	30	24	14	21
<i>Anxiety Management</i>	22	16	21	20	16	17	25	17	24	20
<i>Attention</i>	26	23	21	25	22	14	26	25	21	24
<i>Imagination</i>	29	25	22	21	25	13	22	30	13	18

<i>Motivation</i>	30	29	26	30	27	19	29	27	22	23
<i>Assertiveness</i>	25	24	20	18	22	16	26	16	19	18
<i>Stress Management</i>	26	22	26	19	22	15	30	27	25	24
<i>Focus on Goal</i>	29	30	20	28	22	17	24	23	7	22

Tab. 3- Values and evaluations of the QUAM test of the experimental group – ex-ante

ITEM	Average	Standard deviation	Median	Minimum value	Maximum value	Qualitative Evaluation
<i>Self-esteem</i>	17	3,82	18	9	23	Fair
<i>Anxiety Management</i>	14,1	3,14	13	10	20	Relatively Low
<i>Attention</i>	16,4	2,97	17	10	20	Relatively Low
<i>Imagination</i>	14,1	3,99	15	8	20	Relatively Low
<i>Motivation</i>	16,9	3,33	18,5	13	20	Relatively Low
<i>Assertiveness</i>	12,5	2,42	11,5	10	17	Very low
<i>Stress Management</i>	16,8	3,74	18	10	20	Relatively Low
<i>Focus on Goal</i>	14,7	2,93	15	5	21	Relatively Low

Tab. 4- Values and evaluations of the QUAM test of the experimental group – ex-post

ITEM	Average	Standard deviation	Median	Minimum value	Maximum value	Qualitative Evaluation
<i>Self-esteem</i>	24	5,2	25	14	30	Good
<i>Anxiety Management</i>	20	3,3	20	16	25	Fair
<i>Attention</i>	23	3,6	24	14	26	Good
<i>Imagination</i>	22	5,9	22	13	30	Good
<i>Motivation</i>	26	3,7	27	19	30	Excellent
<i>Assertiveness</i>	20	3,7	20	16	26	Fair
<i>Stress Management</i>	24	4,3	25	15	30	Good
<i>Focus on Goal</i>	22	6,7	23	7	30	Good

Tab. 5- QUAM test of the students in the control group - ex-ante

ITEM	1	2	3	4	5	6	7	8	9	10
<i>Self-esteem</i>	15	7	10	10	10	9	14	8	15	10
<i>Anxiety Management</i>	18	20	18	22	22	18	20	24	17	22
<i>Attention</i>	21	18	21	22	22	18	21	17	16	22
<i>Imagination</i>	9	7	9	6	6	7	12	9	14	6
<i>Motivation</i>	14	9	12	6	8	9	16	14	14	6
<i>Assertiveness</i>	15	18	16	22	22	22	24	20	22	22
<i>Stress Management</i>	28	29	25	30	30	28	28	23	21	30
<i>Focus on Goal</i>	11	6	8	6	6	7	10	10	13	6

Tab. 6 - QUAM test of the students in the control group - ex-post

ITEM	1	2	3	4	5	6	7	8	9	10
<i>Self-esteem</i>	16	7	11	10	10	9	14	8	15	10
<i>Anxiety Management</i>	18	20	19	22	22	18	21	24	17	22
<i>Attention</i>	22	18	21	22	22	18	21	18	16	22
<i>Imagination</i>	9	7	9	6	6	7	13	9	14	6
<i>Motivation</i>	14	9	12	6	8	9	16	15	14	6
<i>Assertiveness</i>	16	18	16	22	23	22	24	20	22	22
<i>Stress Management</i>	28	29	25	30	30	28	28	23	21	30
<i>Focus on Goal</i>	11	6	8	6	6	7	10	10	14	6

Tab. 7- Values and evaluations of the QUAM test of the control group – ex-ante

ITEM	Average	Standard deviation	Median	Minimum value	Maximum value	Qualitative Evaluation
<i>Self-esteem</i>	11	3	10	7	16	Very low
<i>Anxiety Management</i>	20	2,3	21	17	24	Fair

<i>Attention</i>	20	2,3	21	16	22	Fair
<i>Imagination</i>	9	2,9	8	6	14	Poor
<i>Motivation</i>	11	3,8	11	6	16	Very low
<i>Assertiveness</i>	21	2,9	22	16	24	Good
<i>Stress Management</i>	27	3,2	28	21	30	Excellent
<i>Focus on Goal</i>	8	2,8	8	6	14	Poor

Tab. 8- Values and evaluations of the QUAM test of the control group – ex-post

ITEM	Average	Standard deviation	Median	Minimum value	Maximum value	Qualitative Evaluation
<i>Self-esteem</i>	11	3	10	7	16	Very low
<i>Anxiety Management</i>	20	2,3	21	17	24	Fair
<i>Attention</i>	20	2,3	21	16	22	Fair
<i>Imagination</i>	9	2,9	8	6	14	Poor
<i>Motivation</i>	11	3,8	11	6	16	Very low
<i>Assertiveness</i>	21	2,9	22	16	24	Good
<i>Stress Management</i>	27	3,2	28	21	30	Excellent
<i>Focus on Goal</i>	8	2,8	8	6	14	Poor

As regards the results obtained by the sample group, an increase in the average value of all items was highlighted; the same, compared to the ex-ante average values, were all brought above the threshold value of 17, falling within a positive qualitative evaluation, with peaks in the items Self-esteem (24), Motivation (26) and Stress Management (24). Precisely the value of Motivation is the one that found a difference between the phase before the implementation of the educational project and the subsequent one with a positive variation in the average value of + 0.9; However, the positive variations in all the average values of the items analyzed are significant.

The results of the control group did not show any significant variation in the two time intervals, showing final average values of the items being

evaluated lower than those of the sample group; of note, in a negative sense, are the results obtained in the items Self-esteem (11), Imagination (9), Motivation (11), Focus on Goal (8).

Discussion and concluding remarks

Motivated by the notion of embodied cognition and embodied creativity, the objective of this study was to examine the impacts of engaging in creative arts, specifically creative dance, on the cognitive abilities of school-aged children with SLD. Our goal is to propose an alternative method to traditional teaching, capable of promoting the development of fundamental skills for carrying out daily life and for the future challenges these young students will face in the future. We set out to evaluate whether the experimental teaching proposal was able to train their creativity, strengthen their self-esteem, enhance their skills, although different from the traditional ones of the peer group, to find an effective path to solving a problem or the pursuit of an individual or collective goal.

Bringing out creativity through the body and movement is not an easy task, as social patterns or rules are often followed and it is difficult to get out of one's comfort zone. However, creativity is born precisely from the experience of new possibilities, for this reason it is essential that the environments in which to move are enriched and that through the sensory-motor experience we ourselves can enrich ourselves with content (Serra et al., 2021; Tafuri & Peluso Cassese, 2018; Toto, Peconio & Rossi, 2023).

This is particularly important in educational contexts, such as school, since students with SLD explore the environment around them through their bodies, overcoming the critical issues imposed by their disorder, and this exploration allows them to acquire not only physical but also mental skills and at the same time allows them to train creativity by exploring new opportunities.

To educate a child in creativity, it becomes essential to establish educational settings that provide a wide array of opportunities, enabling the child to feel secure and empowered to consistently seek out fresh resolutions. The educators' skills are pivotal in this context, requiring them to adeptly craft immersive environments and workshops that positively impact students' inclination to experiment with various innovative movement strategies. This secure setting along with the unbiased approach of the teacher has the potential to cultivate the development of creative abilities.

What environmental enrichment strategies can be used to foster creativity? There are different strategies, our research, in line with Dyer et al

(2017) has shown that surely the winning one is to offer performing arts laboratory.

The performing arts are a set of activities ranging from dance to opera, from theater to music, which allow through the action and use of the body to experience the environment, the stimuli and to acquire skills creative. Movement sonification is an excellent environmental enrichment strategy that promotes learning and the development of creativity in movement (Dyer et al., 2017; Helbo, 1987; Oppici et al., 2020). The link between sound and movement allows for enhanced perception, action and creativity. Dance, as evidenced by the results obtained, plays a fundamental role in the formation and acquisition of creative skills (DANZA E CREATICE SKILLS, Teixeira-Machado et al., 2019).

In fact, in the present study it emerges that the students who participated in the creative dance project had an improvement in mental abilities compared to the children in the control group. The results of the comparison highlight the beneficial effects induced by physical exercise on specific mental abilities, namely: self-esteem, imagination, motivation, the ability to manage stress and the ability to pursue goals. Promoting the development of these skills is even more important for young people with SLD because it represents the basis for effectively overcoming the objective growth barriers that they encounter in various socio-relational contexts, especially school. A training context where these educational objectives are taken into account is certainly to be considered as an inclusive environment that aims to truly promote the enhancement of everyone's abilities without any distinction. If a school acts according to these principles, it will allow today's students with SLD to be active subjects in the community and in all the socio-relational contexts where they will find themselves acting, such as the world of work.

Our research result support the hypothesis that creative dance is not only able to determine beneficial effects from a physical point of view, but has a fundamental role in the development and maintenance of specific mental abilities.

While the analyzed data present an intriguing perspective, it is imperative to provide a clarification. The data under consideration were gathered from a limited sample of individuals and were exclusively juxtaposed with a cohort that does not engage in physical activity. Moreover, in order to ascertain the authentic influence of physical exercise on the assessments examined, it is recommended to juxtapose the data with a cohort of individuals involved in alternative activities. Although these data are preliminary, the mind-body relationship that characterizes dance makes it possible to improve various aspects related to the person, who explores the environment through the body like people with SLD. The body becomes an

instrument of communication between the self and the surrounding environment and acquires the connotation of a lived body through which to create. In this context, the creative arts can play a crucial role in educational settings, offering a pedagogical and inclusive viewpoint on the physical body and motion. This perspective enables, especially in school system, the cultivation of an imaginative and artistic aspect of bodily expression capable of supporting the growth of students with SLD.

In conclusion, this is a reflection in support of the embodied approach applied to creativity, which emphasises the important relationship between body and mind in the development of creativity and other personal skills that are fundamental for the growth of young people, especially if they have specific learning disorders. Creativity is a process that develops through the body, for this reason it is considered important to emphasise the role of the creative movement in school environments. Embodied creativity allows one to learn and explore an enriched environment through the body that becomes an instrument for processing and expressing creative thought and which at the same time makes the environment inclusive. All this highlights the importance to promote in educational and formative settings, such as schools, processes of embodied creativity through the use of effective educative strategies, such as proposals for performing arts laboratory.

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