ANALYSIS OF AN EXPERIMENTAL TEACHING APPROACH FOR THE DEVELOPMENT OF CREATIVE SKILLS IN PRIMARY SCHOOLS

ANALISI DI UN APPROCCIO DIDATTICO SPERIMENTALE PER LO SVILUPPO DELLE CAPACITÀ CREATIVE NELLA SCUOLA PRIMARIA

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ABSTRACT
This study examines the impact of an educational intervention aimed at enhancing the creative abilities of primary school pupils. The qualitative-quantitative approach involved the administration of the Torrance Test of Creative Thinking, supplemented by qualitative data collected through classroom observations, analysis of creative productions and semi-structured interviews. The results support the effectiveness of the teaching intervention as a strategy for enhancing creative thinking.

Il presente studio esamina l'impatto di un intervento didattico mirato a potenziare le capacità creative degli alunni della scuola primaria. L'approccio quali-quantitativo ha previsto la somministrazione del test Torrance Test of Creative Thinking, integrato da dati qualitativi raccolti mediante osservazioni in classe, analisi delle produzioni creative e interviste semistrutturate. I risultati supportano l'efficacia dell'intervento didattico come strategia per potenziare il pensiero creativo.

KEYWORDS
Creativity Development; Experiential Learning; Multidisciplinary Teaching
Sviluppo della Creatività; Apprendimento Esperienziale; Didattica Multidisciplinare

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Introduction

In recent decades, creativity has emerged as one of the key competences for individual and collective success in a global context characterised by rapid technological, social and economic change. The complexity of the contemporary world requires, in addition to technical skills and specific knowledge, a remarkable ability to think critically and innovatively, and to tackle complex problems with original and creative solutions (Guilford, 1950; Runco & Jaeger, 2012). Various studies have shown that creativity is a distinctive element that is fundamental to fostering innovation in various fields.

The Torrance Test of Creative Thinking (TTCT), developed since the 1960s, is a pioneering instrument for measuring creative abilities, assessing dimensions such as fluency, flexibility, originality and elaboration (Torrance, 1966; Torrance, 1974). Although the validity and reliability of the TTCT have been widely documented, in this study the test is used exclusively as a detection tool, while the teaching approach is based on a multidisciplinary protocol that integrates practical, collaborative and reflective activities, inspired by theories of experiential learning (Kolb, 1984) and creativity.

In the primary school context, the integration of activities aimed at stimulating divergent thinking and critical reflection is crucial, as the early years of education offer a particularly high degree of cognitive plasticity, providing fertile ground for innovative educational interventions. Such an approach equips students with the necessary tools to face future challenges and to develop transversal skills that go beyond the mere acquisition of specific knowledge.

This study aims to empirically evaluate, through a controlled experimental design, the effectiveness of a multidisciplinary educational intervention structured in thematic modules aimed at enhancing the different dimensions of creativity. The aim is twofold: on the one hand, to verify the impact of the intervention on creative skills by means of pre- and post-intervention measurements using the TTCT; on the other hand, to explore qualitatively the learning processes and interactive dynamics within the classroom. The integration of quantitative and qualitative data provides a comprehensive picture of the effects of the intervention and contributes to the academic debate on innovative educational strategies.

1. Methodological Approach

The study adopts a qualitative-quantitative approach, integrating numerical data and qualitative analysis, with the aim of providing an in-depth view of the effects of an educational intervention on the development of creativity. The protocol is based on a multidisciplinary perspective inspired by the theories of experiential learning (Kolb, 1984) and creativity (Torrance, 1974). It is important to emphasise that the TTCT has been used exclusively as a tool for detecting creative competences, while the intervention consists of a series of practical and interactive activities.

The evaluation of the intervention's effectiveness was based on a methodological triangulation strategy that integrated:

- quantitative measures (TTCT);
- qualitative measures (systematic observations, analysis of student productions, interviews);
- pre/post comparisons between the experimental and control groups.

To ensure the robustness of the inferences, the quantitative results were subjected to:

- paired-sample t-tests;
- analysis of statistical significance ($p < 0.05$);
- effect size measurement (Cohen's d), with values above 0.7 considered as indicating a medium-to-large effect.

2. Experimental and model approach

The experimental approach involves the creation of two different groups:

- Experimental group: who receive the multidisciplinary teaching intervention.
- Control group: following the standard curriculum without any additional intervention.

3. Inclusion Criteria

In order to ensure a strict homogeneity of the sample, the following inclusion criteria were applied:

1. Age: students aged between 9 and 10 years.

2. Neuropsychological assessment: absence of cognitive, behavioural or developmental disabilities as verified by certified clinical assessments.
3. Socio-economic background: socio-economic homogeneity verified by standardised questionnaires.
4. Educational background: normal educational background as evidenced by school reports from the last two years.
5. Informed consent: obtained from parents and teachers after detailed protocol information.

The total sample consists of 60 students, equally divided into

- Experimental group: 30 students.
- Control group: 30 students.

4. Procedure

- **Pre-Test:**

The TTCT was administered to both groups under standardised conditions to assess basic levels of creative ability.

- **Educational intervention:**

The experimental group took part in a didactic programme divided into four thematic modules, implemented in 2 weekly meetings over 2 months. The activities were designed to stimulate the dimensions of creativity:

- Module 1 – Fluency: brainstorming sessions and collective storytelling.
- Module 2 – Flexibility: free association games and creating stories with constraints.
- Module 3 – Originality: Exercises to develop alternative uses and creative design challenges.
- Module 4 – Processing: Visual storytelling activities and prototyping of illustrated stories.

The control group continued with the standard curriculum.

- **Post-Test:**

At the end of the intervention, the TTCT was administered again to both groups to check for changes in creative skills.

- **Qualitative Data Collection and Analysis:**

The qualitative part was carried out through

- Classroom observations: systematic recording of the interactive and relational dynamics during the activities.
- Analysis of creative productions: evaluation of the works produced by the students.
- Semi-structured post-intervention interviews: collection of feedback through open-ended questionnaires and group interviews, focusing on the tendency to divergent thinking, the ability to generate innovative ideas and collaborative participation.
- Thematic analysis was carried out with the help of NVivo software, which facilitated data coding and categorisation.

5. Data Analysis

The observational criteria adopted in the qualitative component were based on a systematic and structured framework, aimed at ensuring consistency and replicability. Specifically:

- Classroom observations were conducted using a predefined grid that assessed:
  - The frequency and diversity of ideas expressed by students;
  - The level and quality of peer-to-peer interaction;
  - The ability to reformulate or adapt creative proposals;
  - Degree of active participation and collaboration;
  - Verbal and non-verbal indicators of student engagement (e.g., gestures, facial expressions, spontaneous contributions).

  Observations were performed by two independent raters. Inter-rater reliability was assessed using Cohen's kappa, which yielded a high level of agreement ($\kappa = 0.82$), indicating consistency in the coding of behaviours.
- Creative productions (such as drawings, written texts, and illustrated prototypes) were evaluated using analytic rubrics that included the following dimensions:
  - Originality and novelty of the content;
  - Structural complexity and elaboration;
  - Narrative coherence and logical flow;
  - Creative use of materials and multimodal language.

- Semi-structured interviews were transcribed and coded in NVivo using a hybrid coding approach (both deductive and inductive). Key thematic codes included:
    - Divergent thinking and idea generation strategies;
    - Problem-solving approaches;
    - Collaboration and interpersonal dynamics;
    - Reflective awareness of the creative process.

  The convergence of data from these three sources supported the triangulation of results, ensuring greater validity and depth in the interpretation of the observed educational effects.

- **Quantitative Data:**

The TTCT scores were analysed using paired sample t-tests and the effect measure (Cohen's d) to compare pre- and post-intervention scores between the experimental and control groups.

- **Qualitative Data:**

The collected data were subjected to a thematic analysis to identify emerging patterns in relation to:

- Tendency towards divergent thinking.
- Ability to generate innovative ideas.
- Motivation and collaborative participation.

6. Teaching Activities

The teaching protocol adopted in this study was structured in four thematic modules, each aimed at enhancing a specific dimension of creativity: fluency, flexibility, originality and elaboration.

- **Module 1 – Fluency:**
  The activities in this module were designed to stimulate the ability to generate a large number of ideas in a short period of time. In particular, brainstorming and collective storytelling sessions were organised, methods described by Osborn (1953) as fundamental to the liberation of creative thinking and further supported by Guilford's (1950) theories of idea generation.
- **Module 2 – Flexibility:**
  In order to increase cognitive flexibility, free association games were used in which students were asked to link seemingly unrelated words, images or

concepts. These activities were based on the research of Mednick (1962) and Guilford (1950), who pointed out that the ability to associate elements in unconventional ways is a key indicator of creative thinking.

- **Modulo 3 – Originality:**
  This module included exercises in devising alternative uses for common objects, a method identified by Torrance (1974) as essential for promoting originality, i.e. the ability to look beyond traditional patterns and propose innovative solutions.
- **Module 4 – Processing:**
- Finally, to develop the ability to structure and develop ideas, activities were organised to create visual narratives and prototype illustrated narratives. These methods were inspired by Bruner's (1991) theories and Eisner's (2002) studies on the use of art as a tool for organising thinking and visual communication.

The integration of these modules made it possible to create a dynamic and interactive learning environment in which dialogue and confrontation between peers further stimulated the development of creative skills, in line with Kolb's (1984) principles of experiential learning.

7. Quantitative Results

Statistical analysis showed significant increases in all creative dimensions measured by the TTCT in the experimental group, whereas the control group showed no significant changes. In particular:

- Fluency:
  The mean score increased from 15.2 (SD = 3.4) to 19.0 (SD = 3.2) in the experimental group (25% increase, $p = 0.002$).
- Flexibility:
  Scores increased from 12.7 (SD = 2.8) to 15.2 (SD = 3.0) (20% increase, $p = 0.01$).
- Originality:
  The increase was 30%, from 10.1 (SD = 2.5) to 13.1 (SD = 2.7) ($p < 0.001$).
- Processing:
  Scores increased from 8.5 (SD = 2.1) to 10.4 (SD = 2.0) ($p = 0.005$).

Inferential analyses using t-tests and Cohen's d measure (means > 0.7) confirmed the significance of the effects observed in the experimental group, while the control group showed no significant variations ($p > 0.05$).

8. Qualitative Results

The thematic analysis conducted with NVivo revealed several dynamics:

1. **Expressing and sharing ideas:**
   Pupils in the experimental group overcame communication barriers and showed greater confidence in expressing ideas and working together. Testimonials such as:
   "I used to be afraid to speak my mind, but now I feel free to express myself and listen to my classmates' ideas" highlight how the activities transformed the communicative process into a shared construction of knowledge. Teachers observed a more open and collaborative classroom climate.
2. **Cognitive flexibility and adaptability:**
   Participants demonstrated an increased ability to explore multiple solutions and to modify their proposals. Statements such as:
   "Now, when I am faced with a problem, I try to think of different solutions, even those that seem unlikely at first" indicate a significant improvement in flexible thinking.
3. **Collaborative participation and motivation:**
   The learning environment became more dynamic through active participation and the exchange of constructive feedback. Pupils valued group work as evidenced by:
   "Working in a group makes me grow because we come up with ideas together that I would never have thought of on my own".
   Teachers also confirmed an increase in motivation and interaction between pupils.
4. **Critical reflection and thought iteration:**
   During the prototyping and revision phases, students learned to critically reflect on their ideas and iteratively modify them. Testimonials such as:
   "The feedback loop made me realise the importance of not stopping at the first idea" emphasise the shift towards an iterative approach to problem solving.

Finally, the comparison with the control group showed that these dynamics were significantly less pronounced in the subjects who did not participate in the intervention, confirming the effectiveness of the experimental protocol.

9. Discussion

The results of this study confirm and extend the findings of the literature on educational interventions aimed at developing creativity. The significant increase in the dimensions of fluency, flexibility, originality and elaboration in the experimental group supports the hypothesis that a multidisciplinary approach integrating practical, collaborative and reflective methods can effectively enhance the creative competences of primary school students. These results are in line with the findings of Runco and Jaeger (2012), who define creativity as a flexible and dynamic process, and reinforce the classical evidence provided by the theories of Kolb (1984) and Torrance (1974).

Recent studies have highlighted the importance of experiential and interactive learning environments in fostering creativity from an early age. For example, Hennessey and Amabile's (2010) research highlights how adopting teaching strategies that encourage divergent thinking and collaboration can have a positive impact on creative development. Similarly, Sawyer (2012) has highlighted the role of active methods in fostering innovation and problem-solving skills, which are particularly important in educational contexts characterised by rapid change and the need for transversal skills.

The integration of activities structured in thematic modules aimed at stimulating specific creative dimensions made it possible to create an environment in which dialogue and confrontation among peers not only promoted the generation of original ideas, but also a greater awareness of the creative process. This evidence echoes the observations of recent international reports, such as that of the OECD (2018), which highlight how teacher training and innovative curriculum design are key elements in preparing students for the challenges of the 21st century.

Another aspect that emerged concerns the transformation of relational dynamics in the classroom, with qualitative evidence suggesting a greater propensity for collaborative participation and shared critical reflection. These findings are reminiscent of the contributions of Vygotsky (1978) and Bruner (1991), complemented by the recent analyses of Howard-Jones (2014), which highlight

how the enhancement of social interaction and the adoption of pedagogical practices oriented towards active participation can have a significant impact on cognitive and creative development.

Despite its obvious potential, the present study has some limitations, such as the small sample size and the relatively short duration of the intervention. Recent literature (e.g. OECD, 2018) highlights the need for longitudinal studies that can verify the stability of the observed effects over time and their replicability in different educational contexts. Moreover, future research could investigate the specific mechanisms underlying creative learning, using mixed methods and integrating additional evaluation tools, in line with the approach suggested by Runco and Jaeger (2012).

Conclusions

The present study makes a significant contribution to the literature on creative education by demonstrating that a multidisciplinary teaching intervention, based on established theories and enriched by innovative practices, is capable of enhancing the creative skills of primary school children. The quantitative results, supported by qualitative evidence, indicate that the promotion of an experiential and collaborative learning environment - as also recommended by Hennessey and Amabile (2010) and Sawyer (2012) - leads to significant improvements in creative skills. The adoption of specific thematic modules has shown how the integration of activities aimed at stimulating brainstorming, cognitive flexibility, originality and elaboration can foster not only individual growth, but also the strengthening of group dynamics and collective participation. These findings are in line with recent indications from international reports (OECD, 2018), which call for an increased focus on active methods and teacher training to prepare students for future challenges. The practical implications of this study are manifold: on the one hand, they highlight the importance of designing teaching interventions that go beyond the mere administration of tests and promote iterative and shared learning processes; on the other hand, they emphasise the need to invest in the continuous training of teachers so that they can implement pedagogical strategies capable of stimulating creative thinking. These aspects, also highlighted by Howard-Jones (2014), are fundamental elements in the construction of an innovative and student-centred curriculum. Ultimately, the data collected provides a solid empirical basis

to support the integration of creative and multidisciplinary methodologies into the primary school curriculum. While acknowledging the limitations of the study, the emerging evidence suggests that the promotion of dynamic and interactive learning environments can significantly contribute to the formation of critical and innovative citizens in line with the needs of a changing society. Future research, possibly with larger samples and long-term experimental designs, will be crucial to further investigate the mechanisms of creativity development and to consolidate the teaching strategies that have emerged from this research.

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