

Creative Thinking and Teacher Training: Systematic Review of the International Literature

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Abstract: In recent years, creative thinking has been recognized as a key competence for 21st-century education and for the development of knowledge societies (Robinson, 2001; PISA, 2022). Creativity is now understood as a widespread and developable capacity, supported by inclusive educational contexts characterized by positive relationships between teachers and students, which favor autonomy, exploration and active participation (Craft, 2005; Kaufman & Sternberg, 2010; Starko, 2021). Despite such increasing attention, research has focused primarily on students' creativity, neglecting the role of teachers' creative thinking and its connection to teaching practices. Promoting creativity in students requires teachers capable of adopting flexible, innovative approaches open to the unpredictability of educational processes (Craft, 2001; Starko, 2021). In this perspective, simple teaching (Sibilio, 2014, 2023) interprets teaching as a dynamic and adaptive system, oriented towards the management of complexity and the enhancement of plural paths. Starting from these premises, a systematic review of the international literature (2020–2026) was conducted according to the PRISMA protocol, analyzing 20 studies. The results highlight that creative thinking training cannot be limited to the development of technical skills, but requires an integrated approach that includes reflective, socio-emotional and psychological dimensions, underlining the need to rethink teacher training in a systemic way.

Keywords: Creative Thinking; Teacher Training; Creative Teaching.

1. Introduction

As in all areas of life in the twenty-first century, education has also been influenced by the rapidly changing and transforming global context. In an era in which originality and distinctiveness are increasingly required in production, industry and professional life, the need for individuals capable of thinking creatively and generating innovative ideas is growing (Pisa, 2022). The fundamental objective of education, therefore, is not simply to train individuals capable of replicating what has been done previously, but to cultivate the ability to develop new approaches and solutions (Europea, 2000; Craft, 2001; Starko, 2021). In contemporary education systems, therefore, something more is asked of teachers and the role has expanded beyond the simple transmission of factual knowledge; they are now expected to guide and inspire students to engage in creative thinking (Starko, 2021; Sibilio, 2023). However, in the real-world landscape



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of school settings, traditional models seem to persist and teachers often focus on the acquisition of skills or subject-specific knowledge, often in formal learning contexts (Mangion et al., 2025). Not only that, there is also a huge gap in the scientific literature, as there is a lot of research on learning processes and the development of creative thinking in students, but little and non-uniform research focuses on teacher training and how they themselves can be executors and bearers of creative thinking. Yet it is widely recognized that creative teachers are needed to have creative students (Cropley, 2004; Craft et al. 2005; Beghetto et al., 2021; Starko, 2021). Emerging research suggests that promoting an orientation toward creative thinking could offer a more transformative path (Craft et al., 2013; Glăveanu & Beghetto, 2021) both in the way teachers carry out their teaching, and for use in their personal lives. Unlike conventional approaches that focus on acquiring correct answers or procedural knowledge, creative thinking emphasizes the imaginative generation of multiple perspectives and the deconstruction of existing hypotheses (Mangion et al., 2025). In the classroom, this orientation can lead teachers to rethink their role, moving from mere transmitters of content to facilitators of creative exploration, thus fostering a more dynamic and engaging learning environment (Glăveanu et al. 2024). In the debate of Italian pedagogy, there is often talk of simple teaching (Sibilio, 2023) based on the simple perspective that originates in the context of French physiology (Berthoz, 2019; Sibilio 2023). In this vision, the principle of deviation is highlighted, which refers to the mental posture of the teacher to open up to new solutions, to new possibilities, to put it in the words of a famous Greek poet and philologist, Callimachus (310 BC, 235 BC) "To travel along roads never trodden by wagons". Many teachers, however, report feeling insufficiently prepared to implement creative teaching practices, also because such approaches imply an openness to unpredictability and learning processes that cannot be fully planned in advance (Craft, 2001; Starko, 2021; Beghetto, 2021). Therefore, the question of how to make creative thinking really impact on the teacher's daily practice remains. In order to try to provide an answer to this question, we started from a systematic review of the international literature on the subject, to examine first of all the directions taken so far by scholars from all over the world.

2. Materials and Methods

2.1 Objective

The aim of the systematic review is to investigate whether and how, in the last six years, creative thinking has been introduced into teacher training, both post-compulsory training and during. In order to see what has already been done and understand what could be improved and implemented.

2.2 Search method and selection criteria

The systematic review was conducted according to the PRISMA Flow model (Moher et al., 2009), using search engines and scientific journals most representative for the topic (Table 1). The identification of the articles was carried out by keyword research and using Boolean operators: Creative thinking AND teacher training. International Open Access scientific articles in Italian and English, published between 2020 and 2026, have been selected. Exclusion criteria included areas of research outside the

scope of teacher education and the absence of reference to creative thinking. In addition, grey literature, paid scientific articles and publications in languages other than Italian and English were excluded from the analysis (Table 2).

2.3 Data selection and extraction process

The systematic review followed the PRISMA method (Moher et al., 2009), with a flowchart created to outline the four distinct phases (**Figure 1**). The research was conducted on academic databases, search engines and international journals most relevant to the topic, obtaining an initial result of 4503 published papers (**Table 3**). After removing three duplicates, the identification and selection phase began, during which titles and abstracts were evaluated (Prahlahd & van Wyk, 2020). This process excluded 4459 publications due to their focus on research areas not related to the field of teacher training and creative thinking, paid content and the presence of languages other than Italian and English. In the subsequent screening phase, full-text assessments were conducted (Badger et al., 2000) out of 44 works, of which 20 directly addressed the theme of creative thinking applied to teacher training. These 20 studies were included in the final analysis. For each relevant study, a detailed table was compiled (**Table 4**) documenting the bibliographic information (author(s), year of publication), objectives, study population and sample size (if applicable), qualitative and/or quantitative method used, and key findings related to the research context. This process of tabulation has proved to be valuable for the synthesis and interpretation of data, allowing information to be organized analytically around key themes (Arksey and O'Malley, 2005).

Table 1: search engines and scientific journals

Source (database/journal)
Hyde
Google Scholar
Scopus
ERIC
ProQuest
Thinking Skills and Creativity Journal
Journal of Creative Behavior
Creativity Research Journal
Creativity Journal

Table 2: inclusion and exclusion criteria

Inclusion Criteria	Exclusion Criteria
International scientific articles in Open Access	Grey literature (reports, theses, non-peer-reviewed proceedings)
Publications in Italian and English	Articles in languages other than Italian and English
Studies published between 2020 and 2026	Paid scientific articles (not accessible in Open Access)
Studies relevant to teacher	Studies not relevant to the field of

training	teacher education
Explicit presence of reference to creative thinking	Absence of reference to creative thinking

Table 3: results corresponding to each source

Source (database/journal)	Results	Studies selected in the first phase
Hyde	139	12
Google Scholar	1780	4
Scopus	1704	20
ERIC	65	2
ProQuest	564	2
Thinking Skills and Creativity Journal	126	2
Journal of Creative Behavior	65	2
Creativity Research Journal	30	0
Creativity Journal	30	0
Total	4503	44

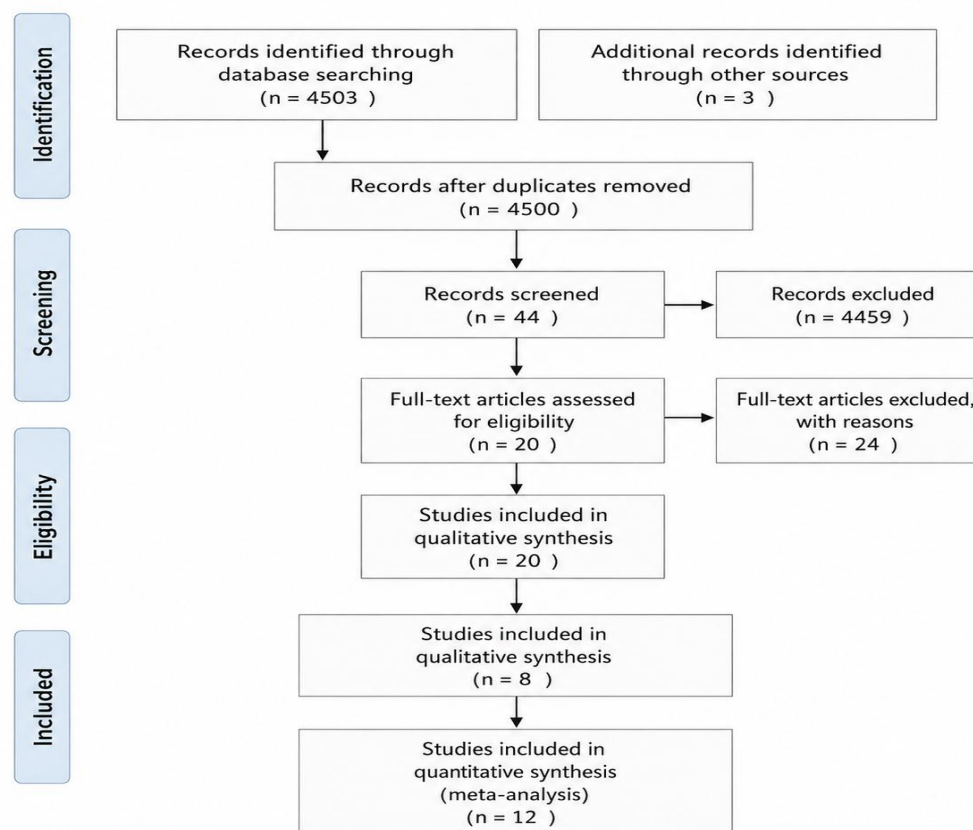


Figure 1: Prisma Flow (Moher et al., 2009)

Table 4: summary table of the studies included

Authors (year)	Objective	Sample	Method	Main results
Suryandari et al. (2021)	Development of creative thinking through SRBP	75 future teachers	Quasi-experimental mixed-methods	Significant improvement in creativity (high N-gain); Benefits on problem solving and collaboration
Calavia et al. (2023)	Evaluate Design Thinking (TCT) Model	108 future teachers	Qualitative (design-based)	Empower creativity, instructional design and soft skills
Fischer & Barabasch (2023)	Analysis, conceptualization, creativity	19 teachers	Theoretical Qualitative	Fragmented creativity; necessary systemic integration into curricula
Marangio et al. (2023)	Creativity as a social process	4 teachers	Qualitative socio-constructivist	Creativity emerges from interaction and collaboration
Anderson (2024)	Creative self-regulation development	1 teacher	Longitudinal case study	Increased flexibility, self-efficacy and didactic adaptation

Mangion et al. (2024)	Psychological factors and creativity	173 teachers	Quantity	Stress ↓ self-efficacy; Hope and Critical Thinking ↑
McLure et al. (2024)	Understanding creativity	13 science teachers	Qualitative	Limited comprehension; need for targeted training
Murphy et al. (2024)	Teaching strategies and creativity	259 teachers	Qualitative	Balance between structure and openness promotes creativity
Pont-Niclòs et al. (2024)	Creative self-perception	100 teachers	Quantity	Medium-high levels; Differences by subject area
Rios-Atehortua et al. (2024)	Beliefs about creativity	152 future teachers	Mixed-methods	Incomplete beliefs; Gap between theory and practice
Skrbinjek et al. (2024)	Interdisciplinary intervention	350 teachers	Quasi-experimental	Improving creativity and soft skills
Aslan et al. (2025)	Creativity and teaching practices	338 teachers	Quantity	Positive relationship between creativity and teaching
Butsirimongkol et al. (2025)	Creative leadership	33 teachers	Mixed-methods	Increased creative leadership and satisfaction
Izquierdo-Sanchis et al. (2025)	Beliefs and practices	110 teachers	Quantity	Discrepancy between beliefs and practices
Mangion et al. (2025)	Possibility thinking	304 teachers	Mixed-methods	Increased self-efficacy and creative openness
Sawada et al. (2025)	Self-efficacy and creative climate	517 teachers	Quantity	Indirect relationships through teaching practices
Sowden et al. (2025)	Modello Creativity Navigator	151 teachers	Longitudinal	Improvements in confidence and skills
Sumarni et al. (2025)	Ethno-STEAM	80 future teachers	Pre-experimental	Improved creativity and problem solving ($r=0.679$)
Sun et al. (2025)	Creativity in ELT	63 teachers	Mixed-methods	Application difficulties; Curricular constraints
Levin et al. (2026)	Leadership and context	5,053 teachers	Quantity	Climate and leadership foster creative practices

3. Results

Four areas emerge from the literature examined in which the studies could be merged:

a) Training program

In this area of research we could include studies that aim to build, validate or use a training method to increase teachers' creative thinking.

Specifically, the first study carried out since 2020 was that of Suryandari et al., 2021, who applied the Scientific Reading Based Project (SRBP) model to the initial training of future teachers. The study involved 75 students from the degree course for future primary school teachers in Indonesia, divided into an experimental group (38) and a control group (37). The training through the SRBP model lasted six months and included six phases: orientation, scientific reading, design and creation, project progress,

analysis, discussion and communication. The results showed a marked improvement in creative thinking in the experimental group (Suryandari et al., 2021).

In chronological order, the study by Calavia et al., 2023 has been included. These scholars wanted to test whether a design thinking methodology for future teachers, called Thinking Create-Teach (TCT), helps to design better teaching materials and integrate design thinking into initial training. The study takes place at the University of Zaragoza and involves 108 prospective teachers randomly divided into experimental group (56) and control group (52). In the experimental group, the TCT methodology is built by an interdisciplinary team of experts. The training lasts 16 weeks and is divided into four phases: research, definition and ideation, conceptualization, prototyping and dissemination (Calavia et al., 2023). The results indicate that TCT contributes to the design of better teaching materials, is integrable into the university curriculum and is perceived as useful training (Calavia et al., 2023).

In 2024, Skrbinjek and colleagues investigate, in in-service teachers, the extent to which an innovative environment and the TTS-IPCD training model can improve creativity. The study involved 350 teachers from 75 Slovenian schools and lasted four years. The TTS-IPCD model is cyclical and involves five phases: teacher as a participant in the training, experimentation in the classroom, reflection, teacher as trainer of colleagues, reflection on one's own competences, followed by the implementation phase in the school. The results, also in this case, show that training has a positive impact on creative thinking, in particular the TTS-IPCD model has been shown to be effective in supporting the innovative behaviors of in-service teachers (Skrbinjek et al., 2024).

In 2025, several studies were carried out. Butsirimongkol et al., 2025, sought to identify what are the components of creative leadership in Thai secondary schools, and based on these they developed and evaluated a training program. In a first phase of the study, through a content analysis and a confirmatory factor analysis of data collected from 700 and 500 teachers, three nuclei emerged for creative leadership were detected: imagination, vision and divergent thinking (Butsirimongkol et al., 2025); the second phase concerned the development of the creative leadership program through the synthesis of the literature on program design and the conduct of an expert seminar with seven specialists to assess its adequacy and feasibility; In phase three, they implemented the program with 33 teachers and evaluated its effectiveness. The results show an effectiveness of the training program in supporting teachers' creative leadership (Butsirimongkol et al., 2025).

Sowden et al., 2025, develop and test the Creativity Navigator framework to support Teaching for Creativity (TfC), i.e., teaching geared toward getting students to work creatively across the curriculum. The focus, in this study, is not so much on the teacher's creativity as a personal trait, but on his confidence, effectiveness, mindset and metacognitive knowledge in designing creative teaching (Sowden et al., 2025). The study is developed in schools in the United Kingdom and involves 151 teachers, divided into control group and experimental group (Sowden et al., 2025). The results show that at the end of the project the teachers of the experimental group score significantly higher, especially in the measure of confidence and effectiveness in the TfC, implementation of creative thinking, perceived everyday creativity and metacognitive knowledge (Sowden et al., 2025). Qualitative interviews also show a change in the way teachers conceive of creativity: no longer just art or "exciting activities", but also

perseverance, discipline, reworking, reflection and quality of questions in the classroom (Sowden et al., 2025).

Sumarni et al., 2025, use the Ethno-STEAM approach in order to improve creative thinking and problem-solving skills in 80 prospective teachers from two universities in Turkey. The training program integrates scientific knowledge with local culture and the activities are structured according to a Project-Based logic: essential question, project planning, monitoring of the work, evaluation of the result and final reflection (Sumarni et al., 2025). The results show an improvement in both creative thinking and problem solving, however the researchers point out that future teachers are mainly able to understand problems and formulate questions, while solution planning is the weakest component (Sumarni et al., 2025).

Finally, Mangion et al., 2025, introduce an innovative approach to creativity, which introduces the Thinking of Possibilities. The study, which involves 304 teachers from Maltese schools, aims to explore how training based on Thought of Possibilities influences teachers in their teaching practice. The results of the study are divided into four main themes: at the beginning of the training, teachers presented a high level of involvement and curiosity, but also fatigue and uncertainty; teachers adopted creativity when they perceived concrete benefits and when they were able to link it to the curriculum; reflective practice strengthened creative identity; finally, stress, workload and lack of time have been shown to have a negative effect on creativity (Mangion et al., 2025).

b) Beliefs

Another area explored by scholars is the beliefs that teachers have about the topic of creative thinking and creativity.

Rios-Atehortua et al., 2024, explored the beliefs of 152 science teachers in Colombia, about creativity. The most important results of this descriptive analysis show that conceptions of creativity are incomplete and erroneous; creativity is seen as a universal and developable potential but they do not have a clear understanding of the processes (Rios-Atehortua et al., 2024).

Later in 2025, Sawada et al., conduct a study involving 517 Japanese teachers compared with adults from the general population, in order to investigate teachers' implicit theories on creativity, the role of creative self-efficacy and the relationship between beliefs, practices and creative school climate. The results show that although teachers reject myths more than the general population, they still do not have a solid knowledge of creativity (Sawada et al., 2025). In addition, the study's analyses affirm the existence of a significant relationship between creative self-efficacy, support for students' creativity and school climate (Sawada et al., 2025).

Finally, Sun et al., 2025, carry out a study involving 63 English teachers in China, with the aim of investigating not only beliefs about creative thinking, but also their teaching practices and possible obstacles to teaching creativity. The results that emerged demonstrate a discrepancy between beliefs (teachers claim to value creativity, but have a partial or distorted understanding) and teaching practices (which in reality do not prove to be creative, on the contrary hinder creativity) (Sun et al., 2025). The main causes, according to scholars, are to be found in poor training, lack of institutional support and conflicts between traditional and creative teaching (Sun et al., 2025).

c) Psychological and contextual factors

The research conducted by Anderson, 2024, differs from the studies reviewed, in that it carries out a two-year case study of a single teacher to identify self-regulation

strategies in the creative process and analyze beliefs, emotions, and attitudes, and how these translate into teaching practices. The study identifies three profiles of creative self-regulation: dysregulated approach, plan-execute approach, draft-review approach (Anderson, 2024). The results of the case study indicate that the teacher's creativity depends heavily on the ability to self-regulate their thoughts, emotions and actions. In particular, the teacher, who had acquired greater self-regulation, better managed his emotions, error and uncertainty, accepted creative risk and continuously reflected on his actions to improve it; he was able to leave control to the students; finally, the draft-revision profile has proven to be more effective as it implies greater creative confidence and better creative products (Anderson, 2024).

Another study carried out in 2024 is that of Mangion et al., which involved 173 Maltese teachers with the aim of investigating how the propensity for creative thinking, hope and perceived stress can influence teachers' creative self-efficacy (CSE). The results showed that creativity is strongly linked to cognitive/emotional resources and psychological well-being; in particular, hope and critical thinking have a positive effect on creative self-efficacy, while stress has a negative effect (Mangion et al., 2024).

Finally, in 2026 Levin et al., carried out a major study involving 5,053 teachers from 148 schools in Kyrgyzstan, in order to analyze how teachers' creativity is influenced by professional relationships (with the manager), job resources (trust between colleagues) and job demands (stress) (Levin et al., 2026). The results showed that trust among teachers and colleagues increases engagement and creativity; a positive relationship with the manager reduces stress, increases confidence and indirectly influences creativity, finally stress increases tension by reducing creativity (Levin et al., 2026).

d) Teachers' self-perception

In 2023, Fisher et al. interviewed 19 secondary school teachers in German-speaking Switzerland in order to understand how they perceive creativity and whether it is actually practiced in teaching. The results show that teachers perceive students' creativity as disturbing and difficult to manage, conforming to an educational system that favors convergent thinking and discourages risk and experimentation; finally, creativity is rarely applied in practice (Fisher et al., 2023).

Marangio et al., in 2023, in accordance with the previous study, investigates how four Australian teachers interpret creativity in their role. The results confirmed that while they recognise the value of creativity, it is not systematically integrated; moreover, there are erroneous beliefs as it is often linked to personality (Marangio et al., 2023).

In 2024 McLure et al., investigate how 13 science teachers in Australia understand creativity and promote it in the classroom. In agreement with previous studies, the scholars note that there is a partial understanding of the real meaning of creativity and that lack of time, training and resources are seen as main obstacles (McLure et al., 2024).

Another study carried out in 2024 is the one conducted by Murphy et al., which propose to investigate the extent to which teachers implement critical and creative thinking in the Australian curriculum and to explore their level of confidence and the ways in which critical and creative thinking is taught. They involved 259 primary and secondary teachers in Australia and found that they consider critical and creative thinking fundamental but do not consider themselves sufficiently prepared; in fact,

critical and creative thinking, although integrated into disciplinary activities, is not explicitly taught (Murphy et al., 2024).

Pont-Niclòs et al., 2024 aim to investigate the perception that 100 Spanish secondary school teachers have of their creativity as an identity and subjective dimension; and they saw that they tended to report moderate-high values, but that they perceived themselves as more creative in the everyday/artistic field rather than in the scientific field.

Next, Aslan et al., 2025, investigate the relationship between creative thinking tendencies and instructional behaviors that promote creativity, in 338 in-service faculty, in the STEM context, in Turkey. The results of this study state that there is a positive correlation between creative thinking and creative teaching practices, and that STEM education increases both creative thinking and teaching practices (Aslan et al., 2025).

Finally, Izquierdo-Sanchis et al., 2025 analyze teachers' creative self-perception and their beliefs about teaching for creativity. The study involves 110 Spanish teachers. The results showed that the teachers involved had moderate creative self-perception with generally positive attitudes towards creativity, showing that while they are favorable, they do not perceive themselves as fully competent (Izquierdo-Sanchis et al., 2025).

4. Discussion

From the analysis of the studies included in the systematic review, four main themes related to creative thinking and teacher training would emerge: training programs, teachers' beliefs, psychological and contextual factors and, finally, teachers' self-perception. Although these areas can be distinguished here on an interpretative level, the results highlight how they are closely interconnected and jointly contribute to outlining a complex and multilevel picture of creativity in the teaching profession. As far as training programs are concerned, the studies analyzed consistently show how structured interventions can foster the development of creative thinking in teachers, both in initial and in-service training. In particular, Suryandari et al. (2021) highlight the effectiveness of the Scientific Reading Based Project model in significantly improving creative thinking. Similarly, Calavia et al. (2023) demonstrate that the Thinking Create-Teach model, based on design thinking, contributes both to the quality of teaching materials and to its integration into university courses. The study by Skrbinjek et al. (2024) further confirms the importance of continuous and collaborative training, showing how a cyclical and reflective model can promote innovative behaviors in in-service teachers. Butsirimongkol et al. (2025) show how training programs based on integrated models can support teachers' creative leadership. Similarly, Sowden et al. (2025) highlight improvements in self-efficacy, confidence, and metacognitive knowledge, as well as a more nuanced conception of creativity as a complex process. Sumarni et al. (2025) also detect an increase in creative thinking and problem solving through the Ethno-STEAM approach, while highlighting critical issues in solution planning. Finally, Mangion et al. (2025) point out that creativity develops most effectively when it is linked to concrete practices and supported by reflection and collaboration, while highlighting the limiting role of factors such as stress and workload.

A second area of inquiry concerns teachers' beliefs about creativity, where studies show significant convergence in finding that, although teachers recognize the value of

creativity, their conceptions are often incomplete or distorted. Ríos-Atehortua et al. (2024) highlight how creativity is generally considered a universal and developable capacity, but without a clear understanding of the underlying processes. Similarly, Sawada et al. (2025) show that, while rejecting some myths more than the general population, teachers lack a solid understanding of the construct, while a significant relationship emerges between creative self-efficacy, student support, and school climate. The study by Sun et al. (2025) introduces a particularly relevant element, namely the discrepancy between beliefs and practices: teachers claim to value creativity, but adopt teaching practices that often do not favor it. This inconsistency is attributed to factors such as a lack of training, limited institutional support and the tension between traditional and innovative teaching approaches.

A further line of research concerns psychological and contextual factors, which emerge as fundamental determinants for teaching creativity. Anderson's (2024) study, through an in-depth analysis of a single case, highlights the central role of self-regulation in the creative process, showing how the ability to manage emotions, uncertainty and risk is closely connected to the quality of teaching practices. In particular, the profile defined as "draft-revision" is the most effective, as it favors a reflective and open attitude to error. In line with these findings, Mangion et al. (2024) demonstrate how psychological variables such as hope and critical thinking have a positive effect on creative self-efficacy, while stress exerts a negative influence. On a larger scale, Levin et al. (2026) highlight how teachers' creativity is influenced by organizational and relational factors, such as trust among colleagues, the quality of school leadership and job demands, underlining the systemic nature of the phenomenon.

Finally, the area relating to teachers' self-perception highlights a further critical element, in fact the studies analyzed converge in showing that teachers attribute great value to creativity, but do not perceive themselves as fully competent in promoting it. Fisher et al. (2023) highlight how creativity is sometimes perceived as a disturbing element, in an educational system that favors convergent thinking and discourages risk. Similarly, Marangio et al. (2023) and McLure et al. (2024) show a partial understanding of creativity and its non-systematic integration into teaching practice. Murphy et al. (2024) note a clear gap between perceived importance and implementation capacity, while Pont-Niclòs et al. (2024) highlight how creativity is perceived unevenly, especially in the artistic rather than scientific domains. Finally, studies by Aslan et al. (2025) and Izquierdo-Sanchis et al. (2025) confirm the existence of a relationship between creative self-perception and teaching practices, while showing only moderate levels of self-efficacy.

Overall, the results of the present review suggest that teacher creativity cannot be considered an isolated competence, but must be interpreted as a complex phenomenon that emerges from the interaction between training, beliefs, psychological factors and professional context.

5. Conclusions

In light of these findings, the review would suggest some relevant implications for educational research and practice. First of all, it seems necessary to develop initial and in-service training courses that explicitly address the theme of creativity, integrating theoretical knowledge, teaching practices and moments of professional reflection. Secondly, it is essential to intervene on teachers' beliefs, promoting a more articulated

and scientifically based understanding of creativity, in order to reduce the discrepancy between intentions and practices.

In addition, the results indicate the importance of adopting a systemic perspective, which considers the role of organizational and relational conditions in favoring or hindering creativity. It also appears necessary to promote the development of teachers' creative professional identity, strengthening their self-efficacy and providing concrete tools for teaching creativity in an explicit and intentional way.

In conclusion, teachers' creativity would emerge as a multidimensional skill that would require an integrated approach, capable of connecting training, beliefs, psychological factors.

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