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SCAMPER and TRIZ Strategies in Developing Creative Thinkingm: A Comparative Analysis and Integrative Pedagogical Framework

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ABSTRACT:

This study comparatively examines SCAMPER and TRIZ as two prominent strategies for fostering creative thinking, mapping their theoretical foundations, generative mechanisms, and points of pedagogical convergence and divergence. The research responds to a genuine gap in the literature: systematic comparisons of these two strategies remain scarce, and attempts to synthesize their strengths into a unified model are rarer still. Adopting a descriptive-analytical comparative methodology grounded in a review of relevant scholarly literature, the study finds that SCAMPER offers greater flexibility in generating creative ideas through prompting questions that develop divergent thinking, while TRIZ provides a more rigorous framework for analyzing contradictions and solving complex problems through convergent reasoning. The two strategies, however, stand in functional complementarity rather than competition. On this basis, the study proposes an integrative five-phase pedagogical framework, problem exploration, contradiction analysis, alternative generation, solution development, and evaluation, designed to cultivate creative thinking skills systematically across educational levels.

KEYWORDS: creative thinking, SCAMPER, TRIZ, Instructional strategies, integrative pedagogical framework

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استراتيجيتا سكامبر (SCAMPER) وتريز (TRI Z) في تنمية التفكير الإبداعي: تحليل مقارن وبناء إطار تربوي تكاملي

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ملخص البحث

تناولت هذه الدراسة مقارنة تربوية بين استراتيجية SCAMPER ونظرية TRIZ بهدف الكشف عن أوجه التكامل بينهما في تنمية التفكير الإبداعي، ثم دمج ميزاتهما في إطار تعليمي متكامل.

وقد كشفت النتائج أن الاستراتيجيتين تنطلقان من مسلّمة مشتركة مفادها أن الإبداع مهارة قابلة للاكتساب والتطوير، غير أنهما تتباينان في المنهج؛ إذ تُعنى SCAMPER بتوليد أكبر قدر من الأفكار عبر أسئلة تحفيزية تُنمّي التفكير التباعدي، في حين تنصبّ TRIZ على تحليل التناقضات ومعالجة المشكلات المعقدة وفق منهج منظومي يُعزّز التفكير التقاربي.

وانبثق عن هذا التكامل إطارٌ تربوي مقترح يمر بخمس مراحل متتابعة: استكشاف المشكلة، وتحليل التناقضات، وتوليد البدائل، وتطوير الحلول، والتقويم والتحسين. ويتميز هذا الإطار بجمعه بين التوليد الحر للأفكار والتحليل المنظم للمشكلات في مسار تعليمي واحد، مما يجعله نموذجاً إجرائياً صالحاً للتوظيف في تصميم الأنشطة الصفية وبرامج إعداد المعلمين، ومنطلقاً لأبحاث مستقبلية في مجال تعليم التفكير الإبداعي.

الكلمات المفتاحية: التفكير الإبداعي، سكامبر (SCAMPER) ، تريز (TRIZ) ، الاستراتيجيات التعليمية، الإطار التربوي التكاملي.

1. INTRODUCTION

Creative thinking has come to occupy a central position in contemporary educational reform, largely because of its role in developing minds capable of keeping pace with accelerating knowledge production and rapid technological change. A growing body of educational literature has moved away from treating learning as memorization toward treating it as knowledge construction, a shift that repositions creativity from a supplementary skill to a strategic educational priority, one that is now deliberately embedded in curriculum design (Runco & Acar, 2012). Underlying this shift is a conception of creativity as a complex cognitive structure whose core dimensions, fluency, flexibility, and originality, are not fixed traits but cultivable capacities, responsive to well designed instructional environments and pedagogical strategies.This reconception has driven a broader paradigmatic shift in educational systems: away from transmission based models that treat memory as the primary site of learning, and toward approaches that target the development of higher-order cognitive structures. The learner is no longer positioned as a passive recipient of information but as an active knowledge maker who contributes to its production and elaboration. This orientation aligns with prominent international frameworks that place the development of higher order thinking skills, analysis, synthesis, evaluation, and creative production, at the center of educational priorities (P21, 2019). At the classroom level, these changes have been felt in the redesign of instructional roles and the integration of teaching strategies organized around problem-solving, inquiry, and research-based learning.

As pedagogical approaches have matured, interest has grown in instructional models that offer systematic tools for idea generation and problem investigation. Two strategies have attracted particular attention in this regard. SCAMPER operates through a structured set of generative questions designed to stimulate new ideas by transforming existing ones. TRIZ, by contrast, addresses cognitive impasse through a principled methodology for resolving contradictions and producing innovative solutions, a methodology derived from the systematic analysis of thousands of patents (Altshuller, 2005). Both have demonstrated effectiveness in developing creative thinking across educational levels (Isaksen & Gaulin, 2005; Mann, 2007).The case for studying them together rests on the productive tension between them. SCAMPER draws on flexible, generative thinking through a matrix of transformative questions; TRIZ operates through a more structured analytical logic grounded in inventive principles. That structural difference makes their comparison intellectually substantive rather than merely descriptive, and it opens the possibility of integrative pedagogical frameworks that draw on the flexibility of the one and the methodological rigor of the other. This is where the research problem takes shape: the need for a systematic comparative analysis of the two strategies and an examination of how they might be brought together within a coherent educational framework for developing creative thinking in contemporary learning environments.

Research problem and questions

Despite the widespread adoption of SCAMPER and TRIZ in creative thinking instruction, Arabic language scholarship has yet to produce a systematic comparative analysis that maps where the two strategies converge, where they diverge, and whether they can be productively combined within a unified pedagogical framework. Most existing studies treat each strategy in isolation, applying either the generative logic of SCAMPER or the analytical methodology of TRIZ without exploring what a model that brings both together might look like. This separation limits the educational value that could be drawn from each approach, and leaves a genuine gap in the literature. Against this background, the study addresses the following questions:

What are the theoretical foundations of the SCAMPER and TRIZ strategies?

Where do the two strategies converge and diverge in their approaches to developing creative thinking?

How might an integrative pedagogical framework be constructed that draws on the strengths of both?

Study objectives

The study pursues four interconnected objectives:

To examine the theoretical foundations of SCAMPER as presented in contemporary educational literature.

To examine the theoretical foundations of TRIZ as an inventive problem-solving theory.

To compare the two strategies with respect to their underlying principles, application mechanisms, and the type of thinking each supports.

To construct an integrative pedagogical framework that can be used to design learning activities aimed at developing creative thinking among learners.

Methodology

To address the study's questions, we adopted a descriptive-analytical comparative methodology, an approach suited to theoretical studies that analyze and compare educational concepts and models without direct experimental intervention. This methodology allows for examination of the theoretical structures underlying instructional strategies and analysis of their internal and external relationships (Cohen, Manion, & Morrison, 2018). The study proceeded through the following steps:

Reviewing the scholarly literature on creative thinking and strategies for its development.

Analyzing the theoretical and methodological characteristics of SCAMPER.

Analyzing the theoretical and methodological characteristics of TRIZ.

Constructing a comparative matrix covering key dimensions: the nature of thinking involved, idea generation mechanisms, degree of structure, and the types of problems each strategy addresses.

Deriving the defining features of an integrative pedagogical framework that draws on the strengths of both strategies.

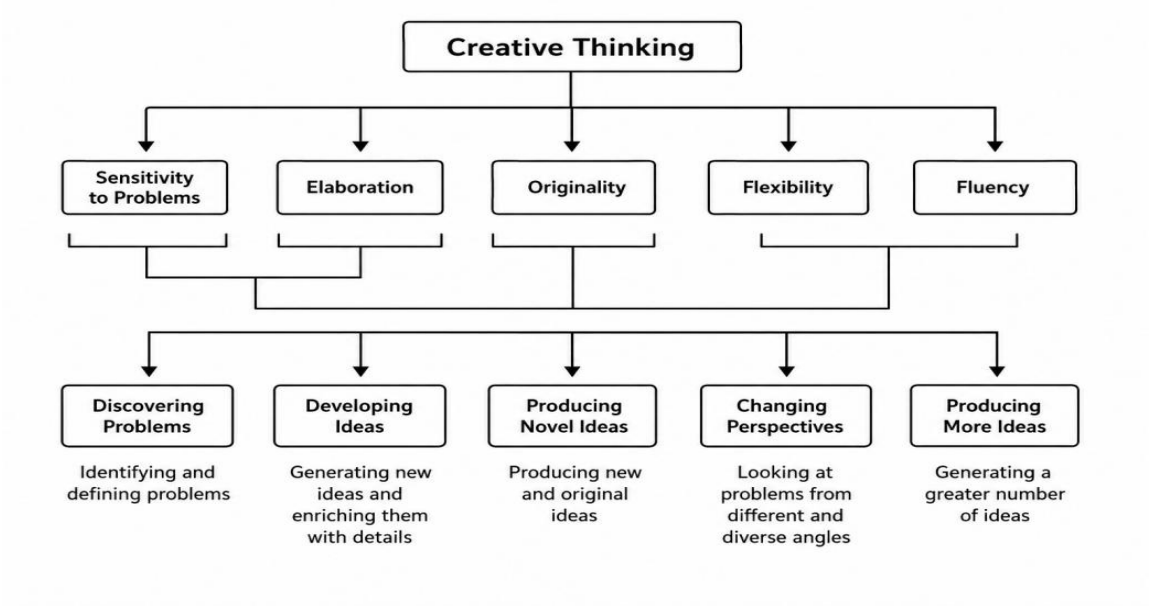
2. Creative thinking

2.1 Nature and Skills

Nature and skills Creativity has long occupied scholars working across educational psychology and the theory of education, and the reason is not hard to see: it touches the most complex of cognitive processes and refuses to stay within disciplinary boundaries. Broadly, it refers to the capacity to produce ideas or alternatives that are novel, original, and practically useful, and that last criterion matters (Runco & Jaeger, 2012). An idea, however inventive, must fit the problem and its context; creativity without coherence is not creativity in any meaningful educational sense. Creative thinking is the cognitive process through which this happens. It allows learners to approach problems from multiple, unexpected angles by continuously deconstructing and reconfiguring, imagining, reorganizing, generating, extending (Sternberg, 2006). Its defining feature is a non-linear dynamism that pulls it away from retrieval-based thinking toward something genuinely productive. Creativity itself is the wider territory. Creative thinking is how you move through it. Four dimensions shape that territory: the creative product, the environmental context, the cognitive process, and individual personal characteristics, and any account that collapses them into one risks missing how they interact (Plucker, Beghetto, & Dow, 2004).

Researchers broadly agree that creative thinking is not a fixed aptitude but a cluster of cognitive competencies, learnable, developable, and responsive to deliberate instructional practice. The skills most consistently identified in the literature are fluency, flexibility, originality, elaboration, and sensitivity to problems. Fluency refers to the capacity to generate as many ideas or alternatives as possible in response to a given situation or problem, a measure of the sheer productivity of a learner's thinking (Guilford, 1967). Flexibility is the ability to shift between different modes of thinking and to approach a problem from changing angles, enabling the production of ideas that break from conventional patterns. Originality goes further: it involves producing ideas that are genuinely novel and uncommon, reflecting an independence of thought that moves beyond received solutions and familiar categories. Elaboration concerns what happens after an idea is formed. It is the capacity to develop a core idea, enriching it with details and supporting elements until it becomes clearer and practically workable. Sensitivity to problems, finally, is the ability to perceive that a problem or gap exists in the first place to detect it, define it precisely, and frame it coherently before any attempt at resolution begins. Taken together, these five competencies constitute the cognitive architecture of creative thinking. Crucially, none of them is beyond reach: all are amenable to development through well-structured instructional strategies, of which SCAMPER and TRIZ are among the most systematically elaborated.

Fig.1. Creative Thinking Skills



Source: Prepared by the researchers

2.2. The importance of developing creative thinking in education

The structural shifts driving the knowledge economy have made creative thinking a genuine educational priority rather than a pedagogical nicety. It is now widely recognized as a motor of cognitive, economic, and social development, and this recognition has, in turn, reshaped what education is actually for. The goal is no longer the transmission of content but the cultivation of learners who can put knowledge to work in situations they have never encountered before (Robinson, 2011).The psycho educational literature reinforces this from a different angle. Developing creative thinking sharpens the capacity to tackle complex problems, strengthens epistemic independence, improves decision-making, and supports the kind of deep, durable learning that memorization-based approaches cannot produce (Craft, 2005). These are not incidental benefits,

they are precisely what the contemporary world asks of educated people. Current pedagogical reality demands approaches suited to an era defined by rapid change and increasingly complex problems. Preparing learners to innovate, adapt, and think originally is no longer optional. This is where strategies like SCAMPER and TRIZ prove their worth: both are capable of transforming the classroom from a space of knowledge reception into one of knowledge production which is, ultimately, what creative education means in practice.

3. The SCAMPER strategy

3.1 Origins and development

SCAMPER traces its roots to Alex Osborn's research on creative thinking and problem-solving in the mid twentieth century, when Osborn was among the most influential figures in the development of brainstorming. Bob Eberle then adapted Osborn's questions into an educational tool designed to stimulate innovative thinking among learners, proceeding from the idea that creativity is a teachable skill like any other. The strategy today functions as a mechanism for developing creative thinking, built on seven cognitive operations for reworking and advancing existing ideas and problems.

SCAMPER rests on several theoretical principles drawn from cognitive psychology and creativity research. Chief among them is the claim that creativity is not a spontaneous process but one that can be stimulated through structured strategies. The strategy also draws on the premise that reprocessing and modifying existing knowledge generates new ideas, consistent with cognitive reconstruction theory. It further assumes that any idea or product can be developed by asking systematic questions that lead the learner to alter its characteristics, combine it with something else, substitute its components, or repurpose it.

3.2 The seven steps of the strategy

The procedural structure of SCAMPER is a seven part matrix of directed questions for generating alternatives:

Substitute: replacing an

element, material, or person with another to achieve a better outcome.

Combine: merging two ideas or products to produce a new combination.

Adapt: reshaping an idea to fit new contexts or environments.

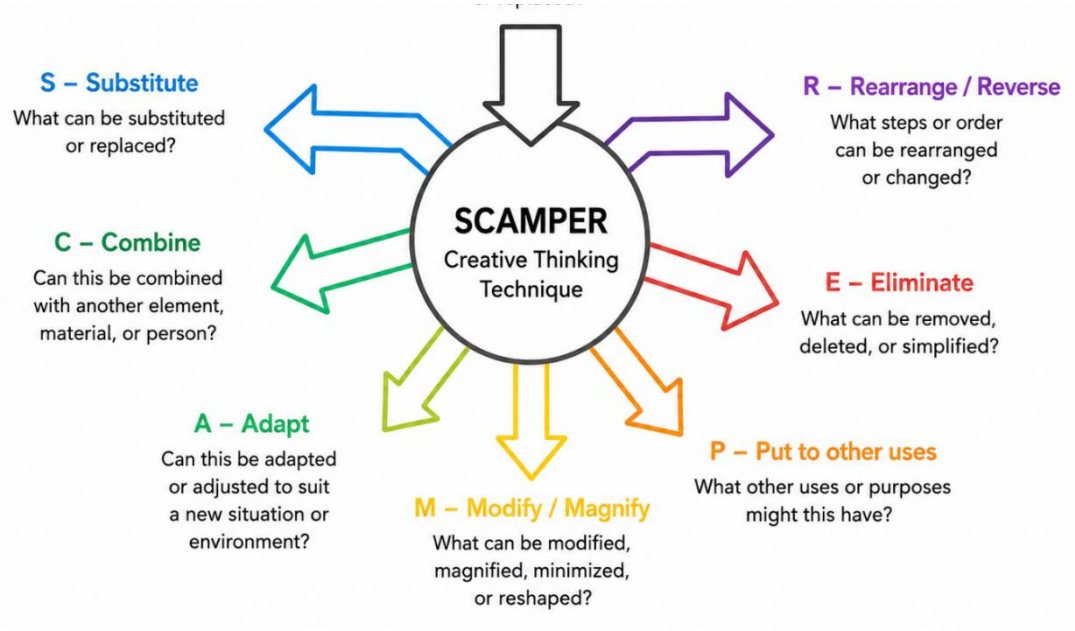
Modify / Magnify: altering structural characteristics or expanding dimensions to increase the functional value of a product.

Put to other uses: applying a product in purposes and fields entirely different from its original function.

Eliminate: removing unnecessary parts to clarify and simplify the idea.

Reverse / Rearrange: inverting steps or reviewing the existing order to uncover unfamiliar angles and perspectives.

Fig.2. Steps to implement the scamper strategy



Source: Prepared by the researchers

3.3. Educational advantages of SCAMPERS

SCAMPER is straightforward to apply across educational levels, relying on simple questions that nonetheless stimulate deeper thinking. It develops fluency, flexibility, and originality by encouraging learners to generate as many unconventional ideas as possible. The strategy promotes active learning, shifting the learner from passive recipient to active participant in knowledge construction. Its flexibility also makes it usable across subject areas, including Arabic language, science, and arts education.

3.4. Limitations and challenges

Like any educational tool, SCAMPER has its constraints. Without clear guidance from the teacher, learners may produce only superficial ideas. Its effectiveness depends considerably on the teacher's ability to manage discussion and sustain motivation. It may also be insufficient on its own for complex problems that require deep analysis and more structured methodologies such as TRIZ. In addition, if overused without integration into a broader pedagogical framework, it can lead to repetition and diminished creativity.

4. The TRIZ strategy

4.1. Origins and development

The Theory of Inventive Problem Solving (TRIZ) is one of the most systematically developed frameworks for understanding how creative thinking works. Its origins lie in the inductive research of Soviet scholar Genrich Altshuller (Jarad, 2017, p. 121), who conducted quantitative and qualitative analysis of thousands of patents across technical and engineering fields, seeking to identify the principles inventors had used to reach their innovations. That analysis led Altshuller to a conclusion that shaped everything that followed: creativity is not a random process but a structured one, governed by identifiable rules (Al Alawneh & Al Khazam, 2025, p. 643). The theory subsequently moved through several developmental stages, expanding from its original engineering and technological applications into educational, administrative, and psychological domains. This

later phase also saw the emergence of "TRIZ Ideality," a concept aimed at maximizing ideal solutions while minimizing side effects (Al-Alawneh & Al-Khazam, 2025, p. 644).

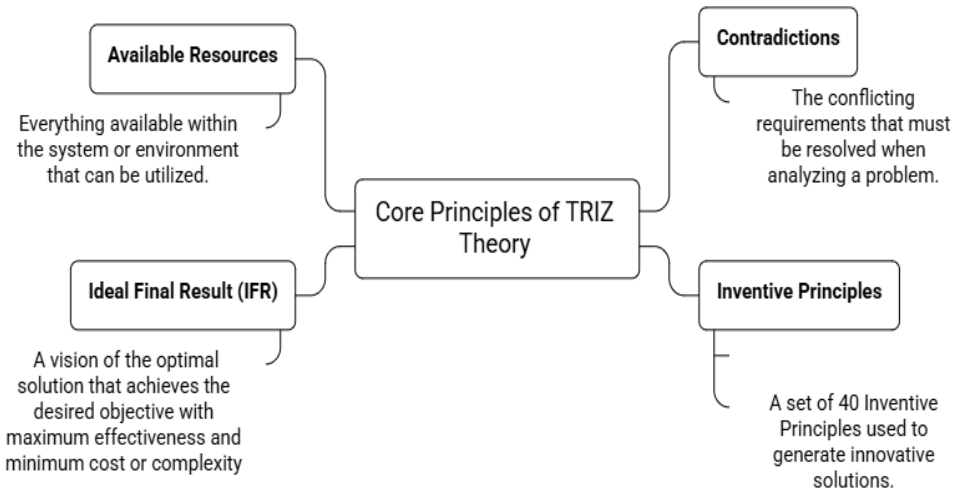
TRIZ rests on a core premise: inventive problems typically arise from contradictions between elements within a system, and resolving those contradictions is the primary pathway to creative solutions. The theory also proceeds from an epistemological position that human inventive experience can be modeled, classified, and organized into general patterns transferable across different contexts and fields. A further principle underlies the framework: the idea of the "directed evolution of technical systems," which holds that systems of all kinds develop according to objective patterns and laws that can be predicted and analyzed.

4.2. The principles of TRIZ

TRIZ comprises a set of systematic tools for analyzing problems and generating creative solutions (Jarad, 2017, p. 38):

- **Contradictions:** the cornerstone of TRIZ. A problem is analyzed by identifying the contradiction between two competing requirements within a system, for example, the need to increase strength without increasing weight.
- **Inventive Principles:** a set of approximately 40 general principles used to generate creative solutions by reorganizing the elements of a problem or modifying their characteristics.
- **Ideal Final Result (IFR):** a conception of the optimal solution, one that achieves the objective without cost or complexity, used as a guiding reference throughout the thinking process.
- **Resources:** everything available within the system or its environment that can be drawn on to find a solution, including time, energy, materials, and information.

Fig 3 : TRIZ Innovation Strategy Principles



Source: Prepared by the researchers

4.3. Educational applications

In educational settings, TRIZ functions as a structured approach to developing higher-order thinking skills, particularly where learners are expected to work through complex, multi-layered problems. Its practical value lies in training learners to break a problem down into its constituent elements, identify the contradictions embedded in it, and then pursue innovative solutions through disciplined thinking. Several educational studies have documented positive

outcomes: Abd al Aziz et al. (2023, p. 168) found that applying TRIZ in science instruction raised achievement levels and developed creative problem-solving skills, while Al Ruwaily et al. (2019, p. 709) reported improvements in analytical and inquiry-based thinking, and Al Qaysi (2024, p. 503) noted gains in students' future-oriented thinking.

The strategy has also been applied in subject-specific contexts. Makhloufi (2017, p. 149) demonstrated its effectiveness in improving creative thinking in mathematics, and Wa'd Allah et al. (2023, p. 735) drew on it to develop creativity among learners of Arabic as a foreign language. Teacher training programs have likewise incorporated TRIZ principles, aiming to equip educators with the skills needed to apply the theory inside the classroom and transform it into an active learning environment (Makhloufi, 2017, p. 144).

4.4. Advantages and limitations

TRIZ is a rigorous, systematic theory that turns creativity into a rule-governed process with clear tools, which makes it well suited to complex problems that call for deep thinking and structural analysis. It offers a coherent framework for developing logical and creative thinking simultaneously, and consistently pushes learners beyond conventional solutions. Its main challenges are also real. The theory is relatively complex and difficult to apply in early educational stages or with non specialist learners. Both teachers and students require preparatory training before it can be used effectively, and the sheer number of tools and branches involved means that mastery takes time and sustained effort. Teachers also need considerable skill in selecting the inventive principle most appropriate to a given subject area (Abd al-Aziz et al., 2023, p. 171). Beyond that, transposing TRIZ from its original engineering context into educational settings requires careful adaptation if it is to retain its effectiveness.

5. Comparative analysis of SCAMPER and TRIZ

This section presents a systematic comparison of SCAMPER and TRIZ across four dimensions: theoretical foundations, idea-generation mechanisms, degree of complexity, and potential for educational application. The analysis draws on the specialized literature in creative thinking and problem solving, with the aim of identifying the structural differences between the two models and the functional complementarities that may make them productive in combination.

Table 1: Comparative analysis of SCAMPER and TRIZ

Dimension	SCAMPER	TRIZ
Theoretical origin	Rooted in brainstorming and idea generation techniques, drawing on Alex Osborn's work and Bob Eberle's subsequent development	A systematic inventive problem solving theory developed by Genrich Altshuller on the basis of patent analysis
Nature of thinking	Flexible, generative thinking oriented toward reshaping existing ideas	Analytical structural thinking centered on identifying and resolving contradictions within a system
Idea-generation mechanism	Directed questions (substitute, combine, modify...) that produce multiple alternatives	Inventive principles, contradiction analysis, and the Ideal Final Result
Degree of complexity	Simple in structure and readily accessible	Requires systematic understanding of multiple analytical tools
Ease of educational application	Applicable across educational levels	Requires preparatory training for both teacher and learner

Types of problems addressed	Simple to moderately complex problems requiring idea generation and expansion of alternatives	Complex problems requiring innovative solutions grounded in contradiction analysis
Creative skills supported	Fluency, flexibility, originality, repurposing	Deep analysis, problem-solving, systems thinking, directed innovation
Appropriate age range	Primary through university level, with procedural simplification where needed	Advanced secondary and university level, particularly in analytical contexts

Source: Prepared by the researchers

The comparison table makes the structural difference between the two strategies clear. SCAMPER and TRIZ share a common goal, developing creative thinking, but they reach it through fundamentally different cognitive architectures. SCAMPER is a generative model. It stimulates thinking through direct, accessible questions, which makes it well suited to contexts where the priority is producing ideas quickly and expanding alternatives without methodological overhead. Its core operations, substitution, combination, repurposing, directly target fluency and cognitive flexibility. TRIZ works differently. Its logic is analytical: break the problem into its structural components, identify the contradictions within it, then resolve them using general inventive principles. This makes it better suited to complex problems that require deep, systematic thinking, and gives it a higher capacity to produce solutions that move beyond conventional responses. The table also shows a practical gap between the two. SCAMPER can be used in a classroom without any specialized preparation. TRIZ requires a higher level of pedagogical and conceptual competence, given its systemic character and the complexity of its analytical tools. This difference is also reflected in the appropriate age range: SCAMPER works across early educational stages, while TRIZ is more appropriate for advanced learners. In terms of creative skills, the contrast is equally clear.

SCAMPER expands thinking outward, more ideas, more alternatives. TRIZ refines thinking inward, better solutions, greater structural depth. This is not a contradiction; it is the basis for a functional complementarity between "diverging thought" and "directing thought. SCAMPER and TRIZ represent two different levels of creative thinking: the first generative and open ended, the second analytical and structured. That difference is precisely what makes combining them viable, a pedagogical framework that brings together the flexibility of idea generation and the rigor of problem analysis, which is the theoretical foundation on which the proposed framework in this study rests.

6. The proposed integrative pedagogical framework

Combining SCAMPER and TRIZ brings together two distinct modes of creative thinking: one generative, concerned with expanding the space of possible ideas and surfacing alternatives; the other analytical, focused on diagnosing problems, identifying contradictions, and working toward innovative solutions. The integration allows idea generation and problem analysis to operate in tandem, helping learners move from open-ended exploratory thinking toward solutions that are both creative and workable across different learning situations.

The proposed framework organizes this integration into a sequence of connected phases, each building on the last. The sequence is not mechanical, it reflects a view of creative thinking as a composite process that moves through inquiry, analysis, generation, and refinement.

Phase 1: Problem exploration and analysis (TRIZ logic)

The process begins by treating the problem as a system, a set of elements, relationships, and variables that need to be understood before they can be addressed. Following TRIZ logic,

learners decompose the problem into its components, map the factors at play, and examine how those components relate to one another. They gather relevant information, identify constraints that might limit possible solutions, and note opportunities that could be drawn on during the problem-solving process. The goal of this phase is a clear, organized understanding of the problem, one that provides the conceptual and methodological footing needed to move forward.

Phase 2: Contradiction analysis (TRIZ logic)

With the problem mapped, learners turn to the tensions embedded within it. Contradiction analysis is central to TRIZ: learners are guided to identify opposing demands between system elements, speed versus accuracy, simplicity versus depth, because resolving those tensions is what makes innovative solutions possible. This phase develops the capacity for deep analytical thinking and systematic problem decomposition.

Phase 3: Generating creative alternatives (SCAMPER questions)

Once the analytical groundwork is in place, learners move into idea generation using SCAMPER. The seven operations, Substitute, Combine, Modify, Adapt, Put to other uses, Eliminate, Reverse/Rearrange, are applied to expand the range of possible responses to the problem. The phase targets fluency and cognitive flexibility, and deliberately encourages non-linear thinking.

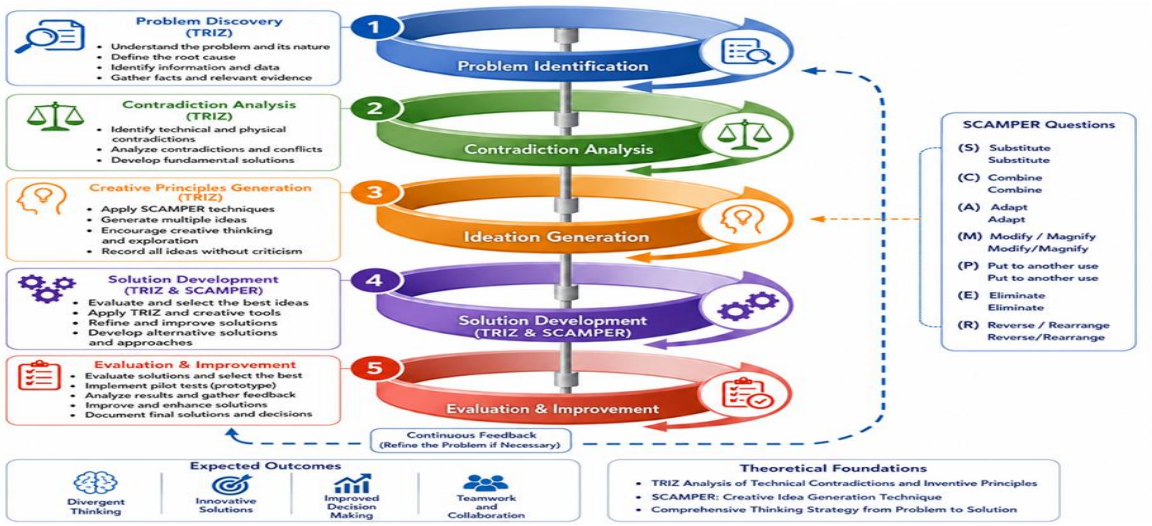
Phase 4: Developing solutions (SCAMPER and TRIZ combined)

This is the integrative core of the framework. The analytical findings from TRIZ and the generative output from SCAMPER are brought together: learners select the most viable ideas and re-examine them through TRIZ inventive principles, refining them for internal coherence and practical feasibility. The combination allows raw ideas to become structured, innovative solutions.

Phase 5: Evaluation and refinement

Proposed solutions are assessed against defined criteria, effectiveness, originality, feasibility, and contextual fit. Feedback drives revision, embedding the principle of continuous improvement that runs through contemporary models of creative thinking.

Fig 4: The Comprehensive Creative Thinking Framework (TRIZ & SCAMPER Integrated Strategy)



Source: Prepared by the researchers

What distinguishes this framework is its refusal to treat analytical and generative thinking as separate operations; rather, it weaves them into a unified pedagogical sequence. The two TRIZ phases lay the groundwork for a deep and precise understanding of problem structure, while SCAMPER opens the space for creative energies to surface and proliferate in the generation of alternatives. The integration phase then manages the transition from quantity to quality in ideation, and the evaluation phase enshrines the principles of scientific organization and disciplined refinement of solutions.

The spiral character of the framework, moreover, reflects the nature of creative learning as an inherently non-linear process, one that is open to iteration and ongoing development, rather than a closed trajectory terminating in a single definitive answer. In this way, the framework offers an educationally viable vision, lending itself to the design of problem-based learning activities and the cultivation of creative thinking across a wide range of educational levels.

7. CONCLUSION

This study set out to conduct a pedagogical comparison between the SCAMPER strategy and the TRIZ theory, with the aim of identifying their points of convergence and divergence in fostering creative thinking, and subsequently integrating the strengths of each into a single, coherent educational framework. The results revealed that both strategies share a foundational premise that creativity is a skill every learner can acquire and refine through practice. They diverge, however, in their mode of operation.

SCAMPER focuses on generating the largest possible number of ideas and novel alternatives through a varied set of prompting questions, and is distinguished by its capacity to develop fluency, flexibility, and originality, the hallmarks of divergent thinking. TRIZ, by contrast, proceeds through the systematic examination of problems and the analysis of their underlying contradictions, arriving at innovative and targeted solutions; its particular strength lies in cultivating systems thinking, complex problem solving, and decision making, that is, convergent thinking.

Building on this complementarity, the study proposed an integrative educational framework comprising five sequential phases: problem exploration, contradiction analysis, creative alternative generation, solution development, and evaluation and refinement. The framework is distinguished by its integration of both divergent and convergent thinking within a single pedagogical sequence, which renders it better equipped to develop creative thinking across its various cognitive dimensions. It further offers a procedural model readily applicable to the design of learning activities, classroom projects, and teacher preparation programmes.

On this basis, the study concluded that the relationship between the two tools is one of functional complementarity rather than competition: where SCAMPER opens the door to free and abundant ideation, TRIZ brings discipline to that process, organising, refining, and selecting the most viable ideas from among those generated. The study accordingly presents an integrative educational framework unfolding across five successive phases, problem exploration, contradiction analysis, creative alternative generation, solution development, and evaluation and refinement, distinguished by its capacity to unite free ideation with structured problem analysis within a unified pedagogical sequence. This makes it a practical model that teachers and curriculum designers can readily deploy in constructing contemporary classroom activities and projects.

The study ultimately concludes that nurturing creative thinking in contemporary education demands moving beyond single-method approaches toward integrative models that combine free ideation with systematic problem analysis. The proposed framework meets this demand, and may serve as both a theoretical foundation and a practical basis for future research in the teaching of thinking and creativity.

In light of these findings, the study offers the following recommendations:

- Integrate SCAMPER and TRIZ into pre-service teacher education and continuing professional development programmes, equipping educators to deploy them in designing learning contexts that support creative thinking.
- Develop curricula and learning activities grounded in the proposed integrative framework, adapted to the cognitive and developmental characteristics of learners at different stages.
- Orient classroom practice toward problem-based and challenge-driven learning, creating genuine opportunities for the application of SCAMPER and TRIZ principles.
- Design assessment instruments capable of measuring creative thinking across its multiple dimensions, moving beyond the exclusive reliance on traditional knowledge-acquisition measures.
- Conduct experimental studies to empirically validate the effectiveness of the proposed integrative framework in developing creative thinking skills among learners across various educational levels.
- Carry out comparative studies between the proposed framework and other models of creative thinking development, such as Design Thinking, the CoRT programme, and the Creative Problem Solving (CPS) model.
- Explore the potential of applying the proposed framework in language education, particularly Arabic language instruction, through the development of linguistic activities targeting creative expression, written composition, and communicative problem solving.
- Encourage researchers to construct integrative pedagogical models that draw on a range of thinking strategies, thereby contributing to the development of educational theories and practices more attuned to the demands of the twenty-first century.
- Harness digital technologies and artificial intelligence in designing interactive learning environments that support the implementation of the proposed integrative framework, affording learners broader opportunities to engage in and practise creative thinking.

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