

A Snapshot of Creativity in PK-12 Education Policies and Practices in the United States

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How to cite this paper: Kim, M. (2024). A Snapshot of Creativity in PK-12 Education Policies and Practices in the United States. *Creative Education*, 15, 1399-1442.

<https://doi.org/10.4236/ce.2024.157085>

Received: April 1, 2024

Accepted: July 14, 2024

Published: July 17, 2024

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Abstract

This study investigates the complex and diverse domain of creativity education in the U.S., particularly within the PK-12 system. It scrutinizes the striking contrast between the absence of explicit mentions in national policies and the ongoing debates on the “Creativity Crisis”. Despite this gap, the research reveals the evidence of some creativity-related initiatives supported by federal and state resources, and especially the significant role of non-governmental actors, who actively promote creativity across the PK-12 landscape. Operating mainly outside the domain of explicit policy, these practices cover a wide range of approaches, emphasizing the varied procedures used to foster student creativity. The paper concludes by suggesting key directions for future research, such as systemic studies, focused examinations of specific programs, assessments of equity in access to creative opportunities, inquiries into public investment in creativity programs, and international comparisons. These diverse approaches aim to shed light on the landscape and impact of creativity education in the U.S.

Keywords

Creativity, Creative Thinking, Creativity Education, Creative Education, Creativity Crisis, PK-12 Education, U.S. Education Policies, Non-Governmental Actors

1. Introduction

Since its inception in 2016, the World Economic Forum’s biennial Future of Jobs Report has been a key resource in exploring the extent of occupational shifts and the potential for job creation, while also suggesting ways to facilitate job transitions. The 2023 edition offers the broadest scope to date, includes insights from 803 companies, employing over 11.3 million people across 27 industry clusters and 45 economies worldwide. The survey highlights 26 essential skills, with crea-

tive thinking ranked second, only behind critical thinking. This underscores the critical need for workers to adapt in evolving workplaces. This skill has consistently been among the top 10 core skills across all four editions of the report since 2016, reflecting its enduring relevance in the evolving job market. In fact, creative thinking/creativity is the first at increasingly important growth, recognized by 73.2% of the organizations surveyed (Di Battista et al., 2023) (Figure 1).

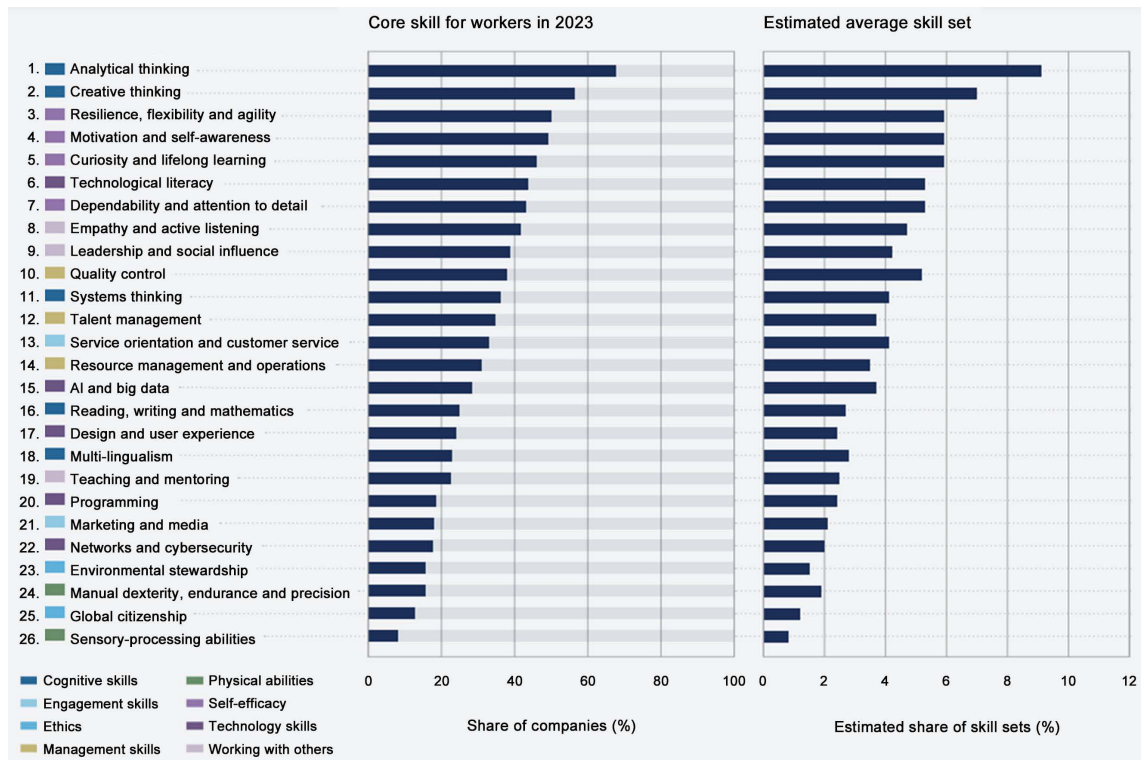


Figure 1. Core skill in 2023—world economic forum, future of jobs survey 2023 (Source: Di Battista et al., 2023).

LinkedIn, the renowned global career platform, analyzed data from its extensive network of over 660 million professionals and more than 20 million job listings to identify the top 15 soft and hard skills in high demand. Notably, creativity emerged as the most in-demand soft skill in both 2019 and 2020, underlining its significant value in the job market (Van Nuys, 2019) (Figure 2).

According to projections by the McKinsey Institute, there will be a significant rise in the need for high-level cognitive skills, such as creativity and critical thinking, by 2030. Their analysis predicts a 40% increase in demand for creativity in the United States and a 30% rise in Western Europe, highlighting the growing importance of these skills in the future job market (Vincent-Lancrin et al., 2019). An in-depth review of eight prominent frameworks for 21st-century competencies, commonly referred to as “skills” in the U.S., corroborates the findings from previous business and social surveys and projections. This review highlights that competencies such as creativity, critical thinking, problem-solving, and the ability to create relevant, high-quality products are consistently identi-

fied as essential skills for the 21st century (Voogt & Roblin, 2012).



Figure 2. The skills companies need most in 2020—LinkedIn research (Source: Van Nuys, 2019).

The importance of creativity/creative thinking is undeniable, therefore, diving deeply into the definition of creativity, in the educational perspective, and in the policy and practice research regarding creativity in education is a crucial need.

1.1. Purpose

This study aims to provide a comprehensive snapshot of creativity education within the U.S. PK-12 policies and practices. The term “snapshot” is used to acknowledge the inherent diversity and complexity of creativity education across the U.S., while aiming to synthesize existing research and identify new perspectives. This inquiry is particularly pertinent in light of recent studies that have highlighted significant gaps in this field.

For example, Grodoski (2015) has noted the absence of explicit federal or state policies that focus specifically on creativity or arts education in the U.S. Henriksen, Creely, and Henderson (2019) have observed that the concepts of creativity and creative thinking are scarcely addressed in the Common Core standards, mentioned only twice and without detailed discussion or unique definitions. Additionally, a study by the Brookings research team (Taylor et al., 2020) examining curriculum documents and mission statements from 22 jurisdictions, including the United States, found that the U.S. ranks among the lowest in terms of competency frequency across five categories, particularly in Creativity.

Given these findings, this study seeks to bridge the identified gaps by examining updated policy documents, current research literature, and resources from non-governmental organizations. Despite the challenges posed by the decentralized

nature of the U.S. education system and the lack of explicit policy mandates, this research aims to provide a more detailed and comprehensive understanding of how creativity education is currently integrated within the U.S. PK-12 system.

1.2. Research Questions

This paper aims to investigate the intricate interactions among educational policies, institutional practices, and the fostering of creativity within the educational framework. It is particularly relevant in the context of the current debates surrounding a “creativity crisis” in the U.S. education system. To address this issue, I intend to answer the following research questions:

- 1) How is creativity defined and operationalized within the PK-12 education system in the United States?
- 2) What roles do federal and state policies, as well as non-governmental organizations, play in promoting creativity within the PK-12 educational landscape?
- 3) What are the existing practices across different states and educational institutions that support the fostering of student creativity, despite the absence of explicit mentions in national policies?

1.3. Methodology

This research employs a literature-based generic qualitative inquiry to comprehensively understand creativity education in the U.S. PK-12 school system. This methodology, also known as basic, interpretive, or fundamental qualitative research, is characterized by its flexibility in data collection and analysis (Jahja, Ramalu, & Razimi, 2021; Kennedy, 2016; Percy et al., 2015, in Ellis & Hart, 2023). This flexibility allows for the incorporation of elements from various qualitative designs without rigid adherence to a single method (Kahlke, 2014), facilitating the exploration of diverse experiential phenomena (Ellis & Hart, 2023).

The research primarily utilizes a blend of pre-existing documents and extensive research literature. This includes official documents from the Department of Education at both federal and state levels, alongside program descriptions and initiatives from non-governmental organizations that actively promote creativity (e.g., Invention Conventions, Science Olympiad, and Maker Faires). Additionally, the analysis incorporates relevant research that has employed qualitative methods, such as interviews with educators or policymakers (e.g., “Mapping the Landscape of Teaching and Learning for the Twenty-First Century in Massachusetts in the Context of US Educational Reform” by Reimers & Chung, 2019).

This generic qualitative approach aligns with the core principles of qualitative research:

- Focus on understanding and interpreting experiences and phenomena: In this case, the research delves into diverse perspectives on what constitutes creativity, explores the potential to cultivate it through teaching, learning and assessment, and examines the role creativity plays within educational policy frameworks.
- Comprehensive overview rather than statistical analysis: The goal is to pro-

vide a rich and nuanced understanding of creativity education within the U.S. PK-12 system, not to generate quantitative data.

- Emphasis on contextualization: The research acknowledges the decentralized nature of the U.S. education system and examines the dynamic interplay between policy, practice, and the contributions of non-governmental actors.
- By employing a generic qualitative approach, this research ensures a thorough and contextualized understanding of creativity education in the U.S. PK-12 system, highlighting the practical implications of collaboration between various stakeholders in the education sector.

2. Foundation

2.1. Defining Creativity and Creative Thinking

For more than 130 years, scholars have endeavored to establish a universally accepted definition of creativity (Runco, 2017, in [Puryear & Lamb, 2020](#)). So far, there have been a substantial number of different definitions in the academic literature. During the planning for the centenary exhibition celebrating the first Nobel Prize, the organizers gathered over a hundred different descriptions of creativity. Among the gathered descriptions, one was contributed by Herbert Simon, a Nobel laureate in Economics, who stated, “we judge thought to be creative when it produces something that is both novel and interesting and valuable” ([Smith, 2005](#)).

“Interesting” might be subjective, but “novel” and “valuable” consistently emerge as the two main elements in the majority of creativity definitions. [Puryear and Lamb’s \(2020\)](#) study ([Table 1](#)), which analyzed articles from business, education, psychology, and creativity journals (n = 600) spanning from 2004 to 2016, highlighted that the most prevalent elements in defining creativity were uniqueness, usefulness, and divergent thinking. These components were observed more frequently in their study at rates of 73%, 50%, and 51%, respectively. Comparatively, in an earlier literature review by [Plucker, Beghetto, and Dow \(2004\)](#), these top three notions were identified at lower frequencies of 58%, 32%, and 27%, respectively. This trend underscores the recurring emphasis on **uniqueness** and **usefulness** as the primary components in the conceptualization of creativity in scholarly articles. This perspective of the “bipartite definition” is widely acknowledged not only by scholars but also by professionals actively engaged in the field (Sternberg & Lubart, 1999, in [Gruszka & Tang, 2017](#)).

Table 1. Elements of creativity definitions over time (2004-2016).

Element	Total
Uniqueness/Novelty	388 (73%)
Artistic	68 (13%)
Psychometric	125 (24%)
Usefulness/Appropriateness	267 (50%)

Continued

Stakeholder Defined	138 (26%)
Accessible by All	112 (21%)
Divergent Thinking	272 (51%)
Problem Solving-Finding	213 (40%)

(Source: Puryear & Lamb, 2020).

Building on the above “unique-and-useful conceptualization,” a definition that “has gained widespread acceptance in scholarly literature” (Plucker, Kaufman, & Beghetto, 2015) originates from Plucker et al. (2004: p. 90):

“Creativity is the interaction among *aptitude, process, and environment* by which an individual or group produces a *perceptible product* that is both *novel* and *useful* as defined within a *social context*”.

PISA (the Programme for International Student Assessment), created by the Organisation for Economic Co-operation and Development (OECD), in the context of assessing 15-year-old students’ creative thinking worldwide, offers a definition of creative thinking as “the competence to engage productively in the generation, evaluation, and improvement of ideas that can result in original and effective solutions, advances in knowledge, and impactful expressions of imagination”. They explain that this definition centers on the cognitive processes and outcomes tied to ‘little c’ creativity in everyday scenarios (Craft, 1996, cited in Bolden, DeLuca, Kukkonen, Roy, & Wearing, 2020). It captures the types of creative thinking that 15-year-old students can realistically show and highlights the importance of students learning to productively generate, reflect upon, and iterate ideas until they achieve a satisfactory outcome (Organisation for Economic Co-Operation and Development (OECD), 2022).

2.2. Creativity Frameworks

Sternberg and Karami (2022) assert that “novelty and usefulness are a start but not an end,” acknowledging the need for more comprehensive models to fully grasp the multifaceted and social aspects of creativity, as highlighted by the OECD (2021). They review four previous frameworks (Multi-C, 4P, 5A, 7C, by Kaufman and Beghetto (2009), Rhodes (1961), Glaveanu (2013), Lubart and Thornhill-Miller (2019), respectively cited in Sternberg and Karami (2022)) and introduce their own model, “The 8Ps of Creativity.” This new model is an extension and elaboration of the core concepts from the 4P framework, which is recognized as one of the most well-known theoretical frameworks in creativity studies (Sternberg & Karami, 2022), originally introduced by Rhodes (1961, cited in Gruszka & Tang, 2017). Based on this Rhodes’ framework, creativity is perceived through four unique perspectives: the product, the process, the person, and the press, which refers to environmental influences (Gruszka & Tang, 2017).

Alternatively, the Multi-C, or Four C Model of Creativity (Kaufman & Beghetto, 2009), proposes that creativity is divided into four distinct categories. Each

category reflects the varied efforts of individuals in different settings and challenges. Mini-c creativity centers on personal creative experiences, particularly learning something new in a specific environment. Little-c creativity is manifested in everyday life through minor but meaningful creative insights that are advantageous to the individual and to others. At this stage, creativity goes beyond personal experiences, emphasizing individual creative contributions. Pro-c creativity is exemplified by professionals in their respective fields, like a scientist authoring a research paper or a painter creating a standard artwork. Finally, Big-C creativity is about revolutionary achievements that dramatically alter the world, akin to the contributions of Einstein. This model suggests, firstly, that creativity is within everyone's reach, not exclusively for the naturally gifted (Abadzi, Martelli, & Primativo, 2014), and secondly, it acknowledges that every personal insight and/or routine creative endeavor is encouraged (ibid, p. 35) and can develop into more substantial forms of creative expression (Beghetto, Kaufman, & Baer, 2014: p. 29). Additionally, while Pro-c and Big-c creativity might not often be seen in schools, studying these types of creativity and interacting with famous creative individuals, when possible, can help students gain insight into their future career goals and aspirations (ibid, p. 30). This process entails a lengthy journey involving rigorous practice, navigating through daunting yet commendable challenges, before ultimately relying on a certain degree of fortune (Figure 3).

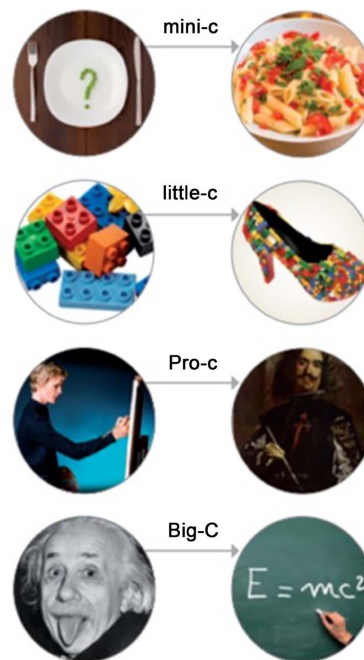


Figure 3. Kaufman and Beghetto (2009)'s 4C-model of Creativity (Source: Abadzi et al., 2014).

Combining the “good start” (Sternberg & Karami, 2022) of 4P Framework and Pro-c and Big-C creativity from 4C-model of Creativity (Kaufman & Beghetto,

2009), Sternberg and Karami (2022), as mentioned before, present the 8Ps Framework of Creativity for grasping creativity and theories surrounding it, while “most theories of creativity have been rather incomplete, dealing only with limited aspects of the phenomenon” (Table 2):

Table 2. The 8Ps of creativity.

-
- 1) **Purpose**—what creativity is for
 - 2) **Press**—environmental forces that incite people to produce creative work
 - 3) **Persons**—the characteristics of creative people
 - 4) **Problems**—the tasks and situations requiring creative solution
 - 5) **Processes**—the mental operations that produce creative work
 - 6) **Products**—the outcomes of creativity
 - 7) **Propulsion**—the way in which, and the rate at which creativity changes people’s thinking
 - 8) **Public**—the audience for creative work
-

(Source: Sternberg and Karami, 2022).

The 8Ps might represent one of the most thorough frameworks for understanding creativity. This approach has the potential to advance the field by incorporating previously underrepresented or insufficiently addressed issues into theories, assessments, and experimental methods related to creativity (Sternberg & Karami, 2022).

2.3. Creativity in Education

While frameworks aim to pinpoint the fundamental components that any pertinent theory should encompass (Ostrom, 2005, in Vesely, 2012), they are “not empirically verifiable” (Sternberg & Karami, 2022). Nevertheless, the issue of whether creativity can be taught or trained has empirical responses. In their insightful review of “Explorations of Creativity,” Abadzi et al. (2014) present compelling evidence to this effect: In Torrance’s 1972 analysis of 142 studies, it was found that 72 percent of the programs led to an improvement in creativity scores. Furthermore, they also share a later study by Scott et al. in 2014 (cited in Abadzi et al., 2014), in which they examined 70 studies and assessed the effectiveness of treatments using Glass’s Delta scores.

If creativity is teachable, what are the various forms of teaching it? Beghetto (2017) clarifies three forms of creativity in teaching: “teaching *about* creativity, teaching *for* creativity, and teaching *with* creativity”. While the objective of teaching about creativity focuses on enhancing understanding of creativity and its study, teaching for creativity concentrates on developing students’ creative thinking and actions. Conversely, teaching with creativity is about imparting any subject, whether it is biology, mathematics, or creativity itself, in a creative manner. Besides having distinct goals, each form of creative teaching also relies on a unique set of knowledge.

Broadly, [Cremin and Chappell \(2021\)](#) examine empirical studies on creative pedagogies conducted between 1990 and 2018. It aims to address the escalating global interest in creativity and creative teaching methods across research, policy, and practice, assessing the evidence about creative teaching practices and their impact on fostering students' creativity. The review, drawing on research from this period, uncovers that creative pedagogical practice is characterized by seven interrelated features: the generation and exploration of ideas; the promotion of autonomy and agency; an emphasis on playfulness; engagement in problem-solving; a culture of risk-taking; collaborative co-construction and teamwork; and the demonstration of teacher creativity. These findings offer insights into the nature of creative pedagogies and their potential effects on students' creative development.

In the school setting, [Kettler, Lamb, and Mullet \(2021\)](#) point out that creativity is reflected in the extent to which students' responses are original, suitable, correct, and beneficial when addressing tasks that are open-ended and do not have a clear solution pathway. Nonetheless, [Beghetto et al. \(2014\)](#) highlight that the belief which equates "teaching for creativity" with solely appreciating the most unconventional and extreme ideas is one of four "misconceptions." These misconceptions lead teachers to think that they cannot simultaneously foster creativity and adhere to the educational standards' skills/content knowledge. [Starko \(2018\)](#) further contends that students can, and indeed should, learn the required content while concurrently enhancing their creative thinking abilities.

Indeed, [Beghetto et al. \(2014: p. 100\)](#) suggest that creativity "can (and should) be" integrated into any existing subject or introduced as a new one, making its evaluation a key component in the education system's triad of curriculum, instruction, and assessment, which they regard as most critical ([Beghetto et al., 2014: p. 102](#)). In line with this, [Foster and Schleicher \(2022\)](#) from the OECD's PISA acknowledge the challenges in enhancing what cannot be seen and drawing attention to what is not measured. They therefore have been working on developing and introducing a new assessment to effectively measure elements of creative thinking for fifteen-year-old students worldwide, with the first test results set to be disclosed in 2024. However, despite its significance in both educational and societal contexts, the assessment of creativity in educational systems still has not progressed at the same rate as the assessment of 'hard skills' such as reading and mathematics, and it also lags behind in the assessment of other 21st Century Skills ([Long, Kerr, Emler, & Birdnow, 2022](#)). In other words, "research and policies related to the assessment of creativity or the uses of assessment to support creativity are still emerging" ([Bolden et al., 2020](#)). Specifically, [Long et al. \(2022\)](#) conducted a thorough examination of creativity education literature from January 2010 to May 2021 and revealed a significant paradox in the assessment of educational creativity. They found that the most robust and effective assessment methods are often missing in classroom settings. This absence is primarily attributed to financial constraints and other obstacles, such as their limited use for research purposes or exclusively with gifted students, as also noted

by Beghetto et al. (2014). This review starkly highlights that the vast majority of children around the globe are not just underserved in terms of creative education but are also profoundly lacking in any sort of assessment within this critical field (Long et al., 2022). Furthermore, teachers frequently hesitate to evaluate creativity, concerned that such assessments might hinder a student's ability to express themselves, or because they view creativity as inherently subjective and thus challenging to assess (Lucas et al., 2013, cited in Bolden et al., 2020).

3. The United States PK-12 Education Landscape

After reviewing the Foundation of Creativity's definitions, modern frameworks, and the current state of implementing the concept of creativity in the context of education, we now shift our focus to the landscape of PK-12 education in the United States. Firstly, this section will provide a brief overview of the policies and practices within the education system of the United States. Secondly, it will delve into the phenomenon known as the "Creativity Crisis" in the United States. These two aspects will lay the groundwork for analyzing the evidence regarding Policies and Practices concerning Creativity Education within the United States' PK-12 system in the subsequent section.

3.1. Overview of Policies and Practices in the United States PK-12 Education System

3.1.1. Policy Landscape of the United States PK-12 Education System

The concept of education policy is complex and somewhat elusive, often eluding precise definition. This domain encompasses a wide range of policy types, extending from those crafted by private organizations to those initiated by international and non-governmental organizations, as highlighted by Espinoza (2009, as cited in Vesely, 2012). Within the public sector, we differentiate between 'big-P' policies, which are formal, typically legislated by governments, and 'little-p' policies that are developed and applied at local levels within specific institutions, as Ball (2008, as cited in Vesely, 2012) explains. This paper adopts the "big-P" perspective, aligning with the definition provided by Rayou and van Zanten (2015, as cited in Viennet & Pont, 2017) that describes "education policies as programs developed by public authorities, grounded in certain values and ideologies, aimed at education stakeholders, and executed by administrators and educational professionals." In the UNESCO "Handbook on education policy analysis and programming", an education policy is described as a comprehensive statement outlining a government's main objectives and priorities in the education sector. This policy "is in line with the country's constitution" and can be broadly applied to the entire education sector or be more narrowly focused on specific sub-sectors, such as primary education, or particular issues, for instance, low enrollment rates (United Nations Educational, Scientific and Cultural Organization (UNESCO), 2013: p. 7). This definition emphasizes the government's role in setting educational goals and addressing key educational challenges.

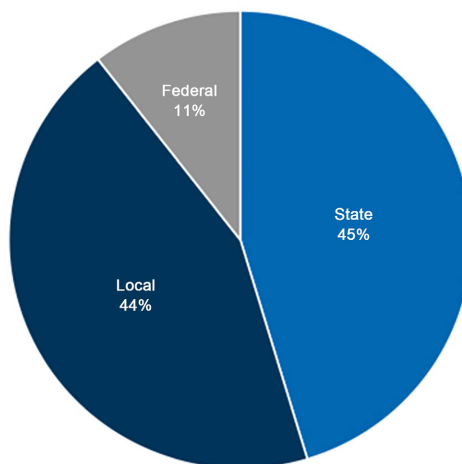
However, the U.S. Constitution does not explicitly mention education. Ac-

ording to the 10th Amendment (as cited in [The Policy Circle, n.d.](#)): “Powers that are not given to the United States by the Constitution, nor denied to the States, are reserved for the States themselves, or to the people.” Simply put, this amendment restricts the federal government to only those powers granted in the Constitution, leaving the authority to self-govern to the states and, ultimately, the people ([The Policy Circle, n.d.](#)). It is these entities, along with various public and private organizations, that are responsible for setting up educational institutions, designing curricula, and establishing enrollment and graduation criteria ([U.S. Department of Education, n.d.b](#)). This decentralized approach is also reflected in how education is financed in America. The bulk of K-12 education funding—89 percent—comes from state and local governments. State governments utilize specific formulas to allocate educational funds to various school districts. These districts then use the state-provided funds, along with additional money from federal and local sources, to finance individual schools ([The Peter G. Peterson Foundation, 2023](#)) (**Figure 4**).



The federal government plays a relatively small, but important role in K-12 education funding

Education Funding by Source for Fiscal Year 2021



SOURCE: U.S. Census Bureau, 2021 *Public Elementary-Secondary Education Finance Data*, May 2023.
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PGPF.ORG

Figure 4. Education funding by source for fiscal year 2021. Source: <https://www.pgpf.org/>.

Despite the Education Department (ED) contributing a relatively small portion of the total funding for education in the U.S., with the Federal Budget for K-12 Education also incorporating contributions from other federal agencies like the Department of Health and Human Services’ Head Start program and the Department of Agriculture’s School Lunch program, the ED is committed to maximizing the impact of its funds. They aim to ensure that the taxpayer money they manage is used effectively, focusing on areas where it can have the greatest benefit ([U.S. Department of Education, n.d.b](#)). As outlined in their Mission Statement, the ED’s roles include setting up and managing federal financial aid

policies for education, overseeing the distribution and monitoring of these funds, gathering and sharing data and research on American schools, highlighting important educational issues at the national level, and working to prevent discrimination to guarantee equal educational access for all (U.S. Department of Education, n.d.a).

3.1.2. Practice Landscape of the United States PK-12 Education System

To truly grasp the complexities of the U.S. education system, focusing solely on public policy, or “big-P”, is insufficient. Stephen J. Ball, in his work “Education Reform: A Critical and Post-structural Approach”, argues that educational policies are often basic and straightforward, whereas educational practice is intricate, dependent on context, and both complex and volatile. He suggests that “**much of practice occurs outside of the confines of the dominance/resistance binary**. There is just more to school and classroom life than this, a third space—other concerns, demands, pressures, purposes and desires” (Ball, 1994, emphasis added). Therefore, recognizing the interplay and impact of **both policies and practices** in PK-12 Education is crucial for a thorough understanding of the varied educational experiences and outcomes. In this context, Figure 5 shows the PK-12 Education Ecosystem Framework (Scott, 2020), which offers a holistic metaphor, particularly aiding communities to understand and optimize human and financial resources within the Education Ecosystem for effective outcomes at the levels of students, families, and the broader community. This perspective is vital given the extensive diversity across the United States, which includes 98,780 public schools in 19,289 school districts across 50 states and the District of Columbia (National Center for Education Statistics, n.d.).

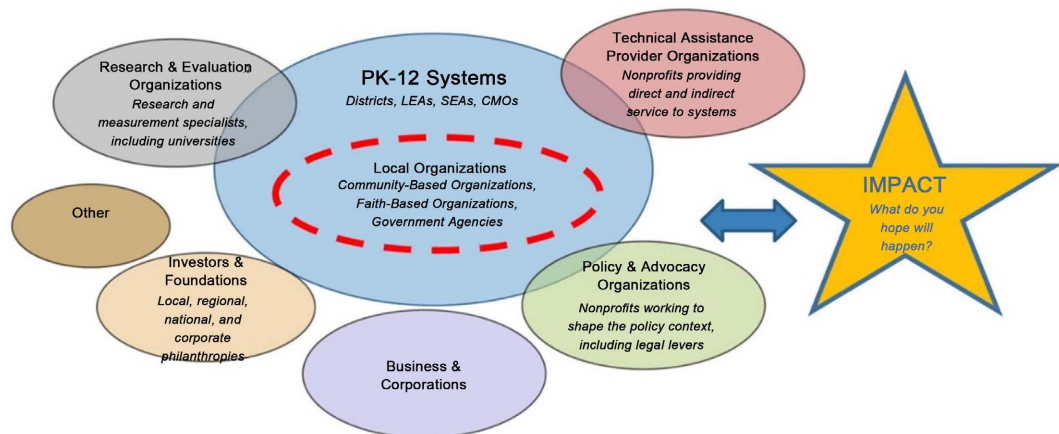


Figure 5. PK-12 education ecosystem (Source: Scott, 2020).

Central to this framework are PK-12 systems, including school districts, local education agencies (LEAs), and charter management organizations (CMOs), as well as state education agencies (SEAs) and regional education service agencies (ESAs). These entities play a crucial role in policy implementation and providing resources, such as professional development, to impact students’ educational

experiences. The core component of the PK-12 Education Ecosystem Framework becomes even more effective through its interactions with various local organizations, the research and evaluation community, advocacy groups, private and philanthropic sponsors, among others. For instance, [Scott \(2020\)](#) states that nonprofit technical assistance providers such as The New Teacher Project, Learn Zillion, Achievement Network, Zearn, WestEd, Education Resource Strategies, and Achieve The Core play a pivotal role. They specialize in designing curricula, offering professional development, and providing tools to enhance the efficiency of teachers and school professionals. The author also emphasizes that the significance of these organizations escalated notably during President Barack Obama's administration, a period when the U.S. Department of Education established specific criteria for states and districts to access new funding sources. These federal mandates prompted significant alterations in teacher evaluation systems and elevated student learning standards in ways previously unseen. To facilitate these changes, districts and states increasingly sought assistance from external experts, many of whom collaborated with multiple states to broaden the reach of new educational **practices** ([Scott, 2020](#), emphasis added). Consequently, in addition to exploring public policies in educational creativity, I plan to showcase several practices to highlight the productive interactions and outcomes that emerge from the diverse stakeholders within this extensive ecosystem. The details of both the policies and practices will be elaborated in Part 3 below.

3.2. Creativity Crisis in the United States Education System

3.2.1. Evidence Supporting the Existence of a Creativity Crisis

The article "America's Looming Creativity Crisis" ([Florida, 2004](#)), which appeared in the October 2004 issue of *Harvard Business Review*, may have been the first to explicitly refer to the "creativity crisis" in the United States. Richard Florida, who also is the author of the bestselling book "The Rise of the Creative Class", argues that the United States is losing its competitive edge in the global economy. This decline, according to Florida, is due to a decrease in openness to new ideas and creative talent. Attributed to this issue are restrictive immigration policies, interference in research funding, and the aging of the baby boomer generation. The article points out that other countries are surpassing the U.S. by investing more heavily in research, education, and innovation, while simultaneously attracting creative workers. To highlight the U.S.'s low ranking in terms of creative occupation engagement, Florida proposes a "Global Creative-Class Index". The importance of creativity as a driver of economic growth is emphasized, urging the business community to champion open talent policies, increased education and research funding, and the fostering of broader creative potential.

The phrase "creativity crisis" has been used in various contexts, not just by Florida to denote the diminishing openness and innovation in the U.S. economy, but also in the field of scientific invention as noted by [Ness \(2015, cited in El Maouch, Jin, Zhao, & Zhang, 2023\)](#), in the psychology of creativity as discussed

by Glăveanu (2014), and to describe the broader issue of the postmodern mind's incoherence (El Maouch et al., 2023). This paper focuses on the most widely recognized aspect of the debate on the decline of creativity in public media and within the United States: the research on trends in creative thinking as measured by The Torrance Tests of Creative Thinking (TTCT). This type of testing developed in 1966 by E. Paul Torrance, has been "renormed" five times, in 1974, 1984, 1990, 1998, and 2008, with 272,599 participants from kindergarten to 12th grade and adults. An analysis of these samples revealed that from sixth grade onwards, creative thinking scores either plateaued or declined. Moreover, the data indicated a significant decrease in creative thinking scores since 1990, despite a rise in IQ scores. This decline was most pronounced among students from kindergarten to third grade. These findings were documented by Kyung Hee Kim from the School of Education at The College of William and Mary in the author's publication, "The Creativity Crisis: The Decrease in Creative Thinking Scores on the Torrance Tests of Creative Thinking" (Kim, 2011) (Figure 6).

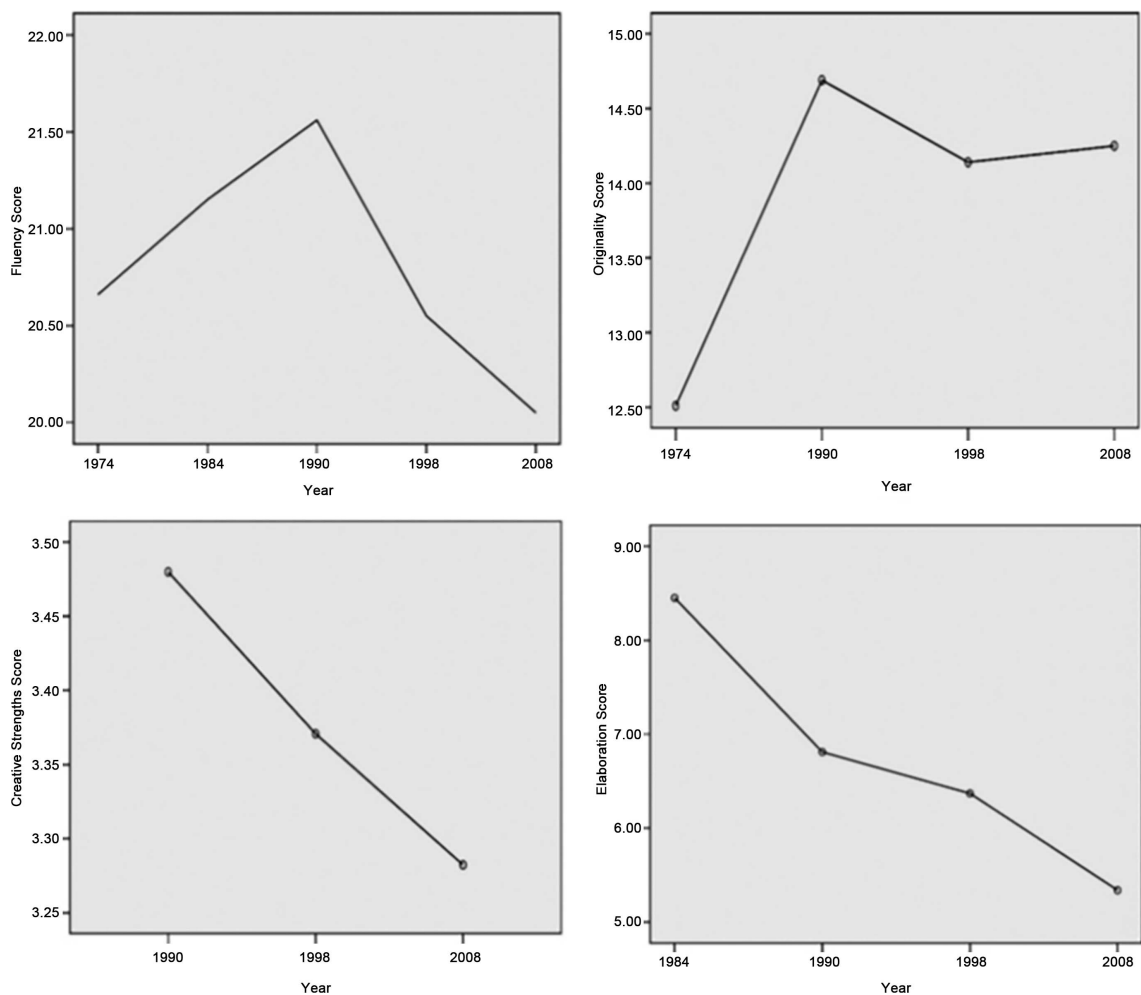


Figure 6. Fluency, originality, creative strengths, and elaboration scores for years 1974, 1984, 1990, 1998, and 2008 (Source: Kim, 2011).

Kim contends that the prevalent rise in standardized testing in U.S. education has steered schools toward favoring memorization and repetitive exercises, thereby diminishing the emphasis on critical and creative thinking. In the author's conclusion, “[s]**tandardization should be resisted**” (Kim, 2011, emphasis added), Kim makes a strong case for resisting this trend and advocates for educational practices in the U.S. that nurture and prioritize individual creativity and thought.

This research gained considerable attention and was featured in the July 19, 2010, edition of Newsweek, in an article titled “The Creativity Crisis” (Bronson & Merryman, 2010). The article not only delineates the diminishing scores on creativity tests but also provides an illuminating anecdote from Jonathan Plucker, a professor at Indiana University during the period under discussion. Plucker observes the predominant emphasis on standardization and assessment in the United States, contrasting it with China's shift towards nurturing creativity and departing from its previous, inflexible educational framework—a paradigm that the United States appears to be increasingly embracing. In 2010, alongside Newsweek, other well-known media outlets such as US News and World Report, the Wall Street Journal, and Oprah Magazine also featured articles on the creativity crisis, indicating its widespread acknowledgment that year (Runco, 2015) (Figure 7).



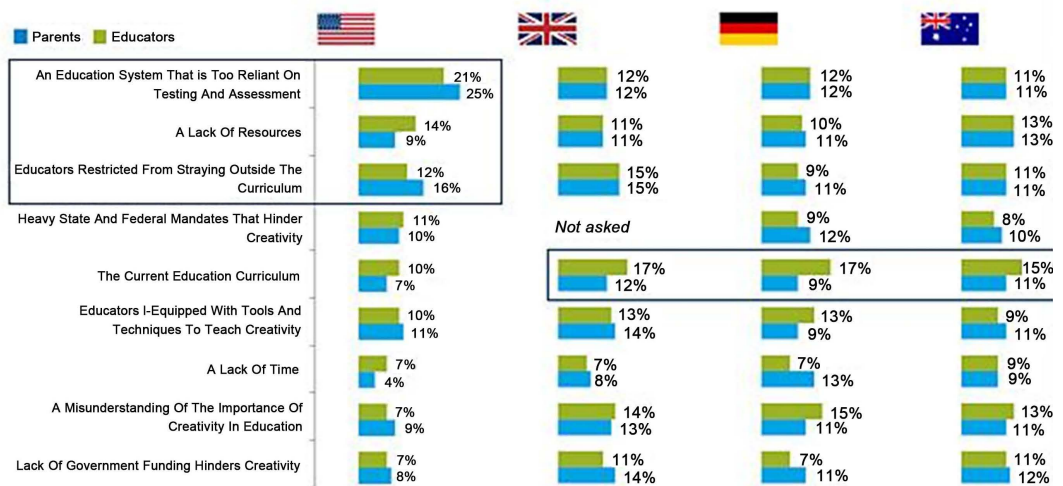
Figure 7. Title page of Newsweek magazine—July 19, 2010 (Source: Hopskin, 2018).

Building on the 2011 research, Kim takes a further step in “Creativity Crisis Update: America Follows Asia in Pursuing High Test Scores Over Learning” (Kim, 2021). Analyzing TTCT data from 1990 to 2017, the author notes “continued declines in CATs, especially in imagination and in young children”. Kim’s research-based CATs theory (Creative Climates, Attitudes, and Thinking skills) is central to this analysis, outlining a process to foster innovation by developing creative environments, attitudes, and thinking skills. Making it more clearly, Kim (2021) (emphasis added) states that “**the creativity crisis has significantly escalated since 2008**” and suggests once more that this could signify

an education system overly fixated on standardized testing, potentially stifling the imagination and open-mindedness of younger children (Kim, 2021).

Kim’s critique, stating that the focus on “testing” and “standards” is leading to a decline in creativity (Kim, 2011, 2021), echoes a broader sentiment in educational discourse. This is encapsulated in a chapter titled “Narrowing curriculum, assessments, and conceptions of what it means to be smart in the U.S. schools: **Creaticide by design**” from the book “How dogmatic beliefs **harm creativity and higher-level thinking**” (Berliner, 2011, in Beghetto et al., 2014, emphasis added). Here, “creaticide” is described as a deliberate undermining of creative skills in literacy, science, and math among school-aged children in the U.S., particularly those from impoverished backgrounds. Diane Ravitch, a former assistant secretary of education (Department of Education, the United States), also asserts that the U.S. education policy’s relentless quest for this “single-minded pursuit of the ‘right answer’ is not likely to unleash creativity, imagination, and innovation” (Ravitch, 2016: p. 294).

The greatest barriers to teaching creativity



What do you believe is the greatest barrier to teaching creativity in education?

Figure 8. Barriers to creativity in education: Educators and parents grade the system. Conducted by Edelman Berland in March 2013 and published June 2013 by Adobe (Source: Berland, 2013).

In a survey of 4000 adults, evenly split between educators and parents of K-12 and higher education students, respondents from the US, UK, Germany, and Australia were asked to identify the principal barriers to creativity in education (Berland, 2013) (Figure 8). Among the educators in the US, the most frequently cited obstacle was an over-reliance on testing and assessment within the education system, highlighted by 21%. Inadequate resources were the second most significant concern (14%), followed by constraints limiting educators from diverging from the curriculum (12%). American parents, while sharing similar concerns, ranked them differently in terms of importance. For parents, the pre-

dominant barrier was the education system's excessive focus on testing and assessment, highlighted by 25%. This was followed by restrictions on educators to adhere strictly to the curriculum (16%), and the insufficiency of appropriate tools and techniques for teaching creativity, which was noted by 11% of the parents.

All of these points of views were happening in the broader context of the early 21st Century, a significant trend in U.S. education, noted by Hollingsworth and Gallego (2007, cited in Starko, 2018: p. 22) and the National Governors Association Center for Best Practices (2010, *ibid*), has been the increasing alignment of teaching with specific state and national standards. Along this line, the [National Research Council \(2011\)](#) also emphasizes that standards-based reform, which entails the development and implementation of rigorous content and performance standards outlining student knowledge and abilities, has become a central organizing principle in most states' and districts' educational improvement efforts. This approach involves aligning the curriculum, assessments, and other system elements with these standards, significantly influencing both state and national educational programs and policies.

3.2.2. Arguments against the Existence of a Creativity Crisis

Contrarily, [Runco \(2015\)](#) suggests that labeling the situation as a “crisis” might be an exaggeration. He refers to it more appropriately as a “concern” rather than a crisis. This perspective is based on the observation that the observed declines in creativity are not extensive across all its components, and none of the effect sizes noted were particularly large. He suggests that social media represents a more significant crisis for creativity, based on several factors: Firstly, a vast majority of people now engage with social networks regularly, often multiple times a day. Secondly, these platforms expose individuals' ideas and behaviors to an audience that can respond and judge, creating external pressure. Thirdly, research highlights the importance of autonomy and intrinsic processes for creative behavior. Lastly, the extrinsic pressures from audience responses on social media can hinder these intrinsic processes essential for fostering creativity.

Within the framework of the potential negative effects of excessive internet usage on students' creativity, [Helding \(2011\)](#) provides insights. The author proposes that if a “creativity crisis” is indeed present in America, its main cause may lie in the scarcity of mental space, essential for fostering creative thinking, particularly in an era inundated with information. In the *Harvard Business Review*, [Schrage \(2010\)](#) challenges the perceived creativity crisis in America, asserting there is no actual deficit in creativity within the U.S. business sector or education. The author suggests that modern children and adolescents are likely receiving ample creative stimulation from video games and social networks on digital devices, which traditional tests of creative thinking may not fully capture. Moreover, the author argues that the definition of creativity has evolved, especially in business innovation, where it remains a subjective concept—what is creative to one might be commonplace to another.

Recently, in their 2021 article titled “Is there really a creativity crisis?”, [Barbot](#)

and Said-Metwaly (2021) challenge the conclusions drawn by Kim (2011). They argue that Kim’s research does not provide substantial evidence for a generational decline in creativity, nor does it support the concept of a “creativity crisis”. Furthermore, regarding the cause of the creativity crisis (if it may have), both Beghetto et al. (2014) and Starko (2018) state that the standards (and the content learning inside) and creativity/creative thinking work together in many ways, supporting and “enhancing” each other.

4. Policies and Practices of Creativity Education in the United States’ PK-12

4.1. Policies of Creativity Education in the United States’ PK-12

Drawing from Vesely’s (2012) framework (Table 3), governments typically engage in three fundamental types of actions:

- 1) Defining Goals and Problems: This involves establishing the objectives and underlying issues addressed by educational policy (i.e., the specific aims and reasons for a given policy).
- 2) Employing Policy Instruments: This relates to the methods and tools used to achieve the set educational goals.
- 3) Creating Institutional Settings: This pertains to determining the entities responsible for policy implementation, including where and under what circumstances these policies are enacted.

My approach to creativity education policy, constrained by time and resources, will be to conduct a concise overview—a “snapshot”—of these three types of governmental actions at the Federal, State, and School District levels in the context of fostering student creativity within the U.S. education system. I plan to scan and examine each category, providing examples or evidence to illustrate how they contribute to nurturing creativity in American educational settings. Acknowledging Grodoski’s (2015) observation of no explicit policy initiatives at federal or state levels targeting creativity or art education in the United States, our analysis will explore how existing policies nonetheless indirectly shape creativity education, using specific examples to demonstrate their impact.

Table 3. Basic types of possible government actions (Adapted from Vesely, 2012).

Basic type	Subtypes	Examples
Problems and goals	Goal formulation	Goal formulation in strategic documents
	Problem formulation	Problem formulation in strategic documents
Instruments	Regulatory instruments	Laws, regulations, decisions
	Economic instruments	Grants, taxes, vouchers
	Information instruments	Campaigns, school rankings, training programs
	Monitoring and evaluation	Nationwide tests
	Curriculum	Nationwide standards, curriculum framework

ing and math. This movement requires education leaders and stakeholders to “think deeply about the purpose of education in the modern era,” according to Susan Patrick, president and CEO of the Aurora Institute, which champions personalized and competency-based education (as cited in [Norville, 2022](#)).

Taking Utah as an example, a leading state in this regard, the Portrait of a Graduate outlines 13 ideal traits for students completing the K-12 system. Among these, “creativity and innovation” feature prominently, alongside academic mastery, wellness civic, financial and economic literacy, digital literacy, communication, critical thinking and problem solving, collaboration and teamwork, honesty, integrity, and responsibility, hard work and resilience, lifelong learning and personal growth, service, and respect ([Utah State Board of Education, n.d.](#)).

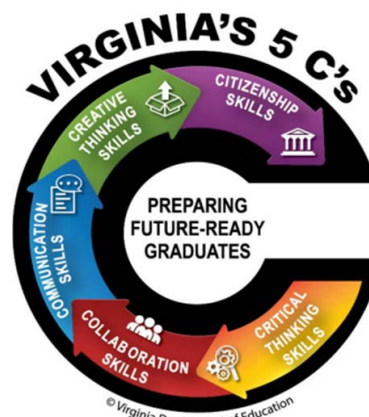


Figure 10. Virginia’s 5C’s (Source: Office of Career, Technical, and Adult Education Virginia Department of Education, 2020).

Focusing more narrowly, Virginia emphasizes the “5C’s” ([Figure 10](#)): critical thinking, creative thinking, communication, collaboration, and citizenship skills. These competencies, combined with the necessary knowledge, experiences, and attributes, are integral for students to succeed in college, the workforce, and to be “life ready,” as outlined in *The Profile of a Virginia Graduate* ([Virginia Department of Education, n.d.](#)). Nonetheless, despite state education departments aligning their Portrait of a Graduate competencies with 21st-century skills, creativity or creative thinking is not always a focus. For instance, it is not mentioned in Indiana’s Graduates Prepared to Succeed (GPS) program ([Indiana Department of Education, n.d.](#)), nor in North Carolina’s list of seven essential durable skills for high school graduates to succeed in the 21st-century workplace, whether in college, career, or the military ([North Carolina Department of Public Instruction, n.d.](#)).

At the school district level, a wide variety of “Portrait of a Graduate” versions exist. Some are developed in alignment with the state’s vision, while others diverge significantly from it. For instance, the Fairfax County Public Schools (in

Virginia) emphasize five key attributes: Communicator, Collaborator, Ethical & Global Citizen, Creative & Critical Thinker, and Goal-Directed & Resilient Individual, which largely align with Virginia State's Portrait (Fairfax County School Board, n.d.). Contrastingly, South Sanpete School District in Utah focused on six competencies: honesty/integrity, communication, problem solving, accountability, learning to learn/growth mindset, and adaptability. This number is less than the 13 competencies outlined by Utah State, and notably, it does not include creativity/creative thinking/innovation (South Sanpete School District, n.d.).

4.1.2. Policies—Basic Type 2: Instruments

Vesely (2012) outlines a diverse range of instruments used in education policies, including laws, regulations, decisions, grants, taxes, vouchers, campaigns, school rankings, training programs, nationwide tests, and curriculum frameworks. We will explore several latest national-level “instruments”: laws, grants, tests, teaching standard, and curriculum.

Acting as the most recent federal legislation for elementary and secondary education in the U.S., the Every Student Succeeds Act (ESSA), which was signed into law by President Obama on December 10, 2015, reauthorized the Elementary and Secondary Education Act of 1965 (ESEA) and replaced the No Child Left Behind (NCLB) Act. A key feature of this reauthorization is its emphasis on a well-rounded education, mentioned 25 times and incorporated in most Titles of the Act. The National Education Association (NEA), through NEA Today, highlights this shift with the title “Goodbye ‘Core Subjects,’ Hello ‘Well-Rounded Education’” (Walker, 2016) as a core element of the new law (Jones & Workman, 2016). The well-rounded education concept under ESSA includes 17 subjects, encompassing traditional areas like English language arts and mathematics, as well as a broad range of other subjects including the arts, humanities, sciences, and social sciences. It also permits states to broaden this definition by adding “any other subject, as determined by the State or local educational agency, with the purpose of providing all students access to an enriched curriculum and educational experience” (English, Cushing, Therriault, & Rasmussen, 2017). Furthermore, Title IV of ESSA allows for the integration of multiple subjects in programs or activities, emphasizing their interconnectedness (Jones & Workman, 2016). This broader scope for all subject areas paves the way for approaches like problem-based learning, project-based learning, and interdisciplinary learning, which actively engage learners and create opportunities for creativity to thrive (Ramlackhan, 2024).

Grants also represent a vital instrument in education policy frameworks. ESSA, which encompasses eight titles and was allocated \$27.7 billion in FY2022 appropriations, represents the cornerstone of federal aid for primary and secondary education (Skinner, 2022). Specifically, Title IV, Part A, hosts the Student Support and Academic Enrichment Grants, allocated \$1.28 billion in FY2022 appropriations. These grants are designed to enhance student achieve-

ment by expanding state and local capacities to offer, among other benefits, access to a comprehensive education. This grant mechanism consolidates various smaller, specific NCLB grants into a more flexible, formula-funded block grant, allowing local educational agencies (LEAs) the freedom to devise their own tailored programs without being restricted to particular subjects or program types (Jones & Workman, 2016). Beyond the Student Support and Achievement Grants, ESSA broadens the definition of a well-rounded education to encompass learning opportunities both within and outside of school settings, as seen in Titles I, II, and IV. For instance, Title I mandates that districts provide a comprehensive instructional program catering to all students, Title II permits the use of funds to integrate extensive literacy instruction into a well-rounded education, and Title IV-B backs initiatives that occur outside of school hours, providing learning opportunities for school-aged children. This enhanced flexibility in fund usage to support a diverse array of subjects in both in-school and after-school programs is crucial for enabling LEAs to address the distinct needs of their students and communities (ibid).

Indeed, ESSA grants are just one component of a wider array. Federal organizations such as the National Science Foundation (NSF) and the Institute of Education Sciences (IES) have supported various research projects aimed at exploring methods for assessing twenty-first-century skills, with some projects touching on aspects of creativity. A notable instance involves a grant of \$553,385 from the NSF awarded to research groups at Pennsylvania State University, Georgetown University, and Johns Hopkins University. These teams are set to collaborate with educators from middle schools and universities to create a novel metric for assessing scientific creative thinking. Additionally, they aim to employ innovative neuroscientific instruments to determine if a brain network, known for forecasting an individual's overall creative thinking capacity, can also foresee their skill in applying creative thought to scientific subjects, beyond the scope of their fundamental cognitive abilities (The U.S. National Science Foundation, n.d.). Another research project funded by the Institute of Education Sciences (IES) is MOTES (The Measurement of Original Thinking in Elementary Students), receiving a \$964,081 grant and led by the University of North Texas. Aimed at assessing late-elementary students' original thinking through automated scoring and text-mining, MOTES seeks to replace time-consuming manual scoring methods, offering a quicker, more accessible solution for assessing creativity and potentially diversifying gifted program participation (Institute of Education Sciences, n.d.).

In terms of creativity assessment within policy at the national level, an examination of the major U.S. testing consortia, namely the Smarter Balanced Assessment Consortium (SBAC) and the Partnership for Readiness for College and Careers (PARCC), reveals a significant oversight. Henriksen et al. (2019) highlight that these consortia's testing materials and frameworks lack any elements designed to assess creativity or foster creative thinking in students. Instead, the typical assessment format involves single-attempt, single-answer questions that

do not provide space for creativity, complexity, risk-taking, or the valuable process of learning through failure and iterative improvement (Croft, Roberts, & Stenhouse, 2015, cited in [Henriksen et al., 2019](#)). [Russell, Braun, and Zhu \(2023\)](#) similarly emphasize that unlike the annual summative tests administered by all states across various grade levels for traditional subjects, there has not been the introduction of any state-level summative assessment targeting the non-content specific skills of the twenty-first century. Rather, the initiatives to assess these modern skills have predominantly been (only) research-oriented, investigating potential methods for their evaluation, akin to the grant-supported examples previously mentioned.

Another instrument of education policy is professional development. In the United States, the standards for teacher knowledge and practice are established by the Council for the Accreditation of Educator Preparation (CAEP), the accrediting authority. [Henriksen et al. \(2019\)](#)'s review of the CAEP standards (version 2013) revealed a lack of terms like "creative," "creativity," "risk," and "failure," as well as the absence of concepts that would imply an encouragement of creativity and intellectual risk-taking in teaching.

The final yet equally crucial instrument under our scrutiny is the national-level curriculum, primarily observed through the widely embraced Common Core Standards. Initially adopted by 46 states, these standards, which have been dropped or altered by roughly half over time ([Russell et al., 2023](#)), set forth the learning expectations for students in grades K-12 in mathematics and English language arts (ELA). Numerous policy analyses reveal that creativity or creative thinking plays a minimal role, if any, within these education standards in the U.S. (Florida State University, 2012 and Sforza, Tienken, & Kim, 2016, as cited in [Henriksen et al., 2019](#)). Indeed, the concepts of creativity and creative thinking are scarcely mentioned, appearing only twice in the standards documents for both mathematics and ELA within the Common Core. [Henriksen et al. \(2019\)](#) notably highlights: "In no place is creativity or creative thinking uniquely defined or discussed beyond cursory, passing mentions."

Table 4. Frequency count of the competencies across the 5 categories for the jurisdictions.

Jurisdiction	CRE	CRI	COM	COR	MIN	CUR	COU	RES	ETH	LEA	MET	GRO	Total
Australia (Federal)	3	3	3	3	3	3	3	3	3	3	3	3	36
British Columbia (Canada)	3	3	3	3	3	3	3	3	3	3	3	3	36
Singapore	3	3	3	3	2	3	3	3	3	2	2	3	33
Finland	3	3	3	3	3		3	3	2	3	3	3	32
Hong Kong (China SAR)	2	3	3	3	3	1	3	3	2	2	3	3	31
Victoria (Australia)	3	3	1	3	3	1		3	3	3	3		26
New Zealand	2	2	2	2	2	2		2	2	2	2	2	22
Portugal	2	2	2	2	2	2		2	2				16

Continued

Chinese Taipei (Taiwan Region)	2	2	2	2	2	2		2				14
Denmark	2	1	1	1	1	1	1	1	1	1		11
England (UK)	2	1	1	1		2	1		1		1	11
Scotland (UK)	1	1	1	1	1	1	1	1	1		1	11
South Korea	2	2	2	1	2	1			1			11
Alberta (Canada)	1	1	1	1	1	1		1		1	1	10
New Brunswick (Canada)	1	2	2	1		1		1	1			10
New South Wales (Australia)	1	1	1	1	1	1	1	1			1	10
Massachusetts (USA)	1	1	1	1	1			1	1	1	1	9
Ontario (Canada)	1	1	1	1	1	1		1			1	9
China	1		2	2	1				2			9
USA (Federal)		1	1	1				1	1			6
Japan	1	1	1	1		1						5
Russia	1	1	1						1			4
Total	38	38	38	37	32	27	19	29	32	21	26	25

(Note: CRE is for Creativity competency); (Adapted from Taylor, Fadel, Kim, and Care (2020). Editors fine-tuned the name of the jurisdiction).

Another study reconfirms the above analysis, with the Brookings research team examining curriculum documents and mission and vision statements from education ministries/departments across 22 jurisdictions, including the United States, during August to October 2019. This investigation resulted in **Table 4**, that outlines the competencies' presence across various categories such as inclusion, identification, progressions, pedagogies, and assessments for each jurisdiction. The table ranks jurisdictions by the frequency of competency mentions from highest to lowest, revealing that the United States falls among the bottom three in terms of competency frequency across these five categories, with a particular omission of Creativity (Taylor et al., 2020).

Yet, as previously addressed during our discussion on the "Creativity Crisis", despite the lack of explicit mention of "creativity", both Beghetto et al. (2014) and Starko (2018) assert that the common core standards—and the content learning they encompass—interact synergistically with creativity and creative thinking, mutually reinforcing and augmenting one another. A scholarly report, issued by a committee formed under the National Research Council (NRC), analyzed competencies, pinpointing several twenty-first-century skills reflected within the Common Core State Standards for English language arts and mathematics, as well as the NRC science framework that underpins the Next Generation Science Standards. This analysis revealed a significant alignment in the domain of "cognitive" skills, notably those categorized as "nonroutine problem solving", which necessitate creativity (National Research Council, 2012). In a recent study, Amadi (2023) investigated the inclusion of 21st-century skills within

the US Next Generation Science Standards (NGSS), comparing them to the specific skills outlined by the Applied Educational System (AES). The author's analysis revealed that while the 4th-grade public school science curriculum partially integrated these skills, they were largely absent in the middle school curriculum. However, of note, creativity appeared to be one of the few skills present in both grade levels.

4.1.3. Policies—Basic Type 3: Institutional Setting

Unlike many nations, the US lacks a unified approach to education. Instead, power rests with individual states and territories, creating a diverse landscape of 56 distinct educational systems. This decentralization is not uniform, though, as the level of control held by state governments varies significantly across the country (Russell et al., 2023).

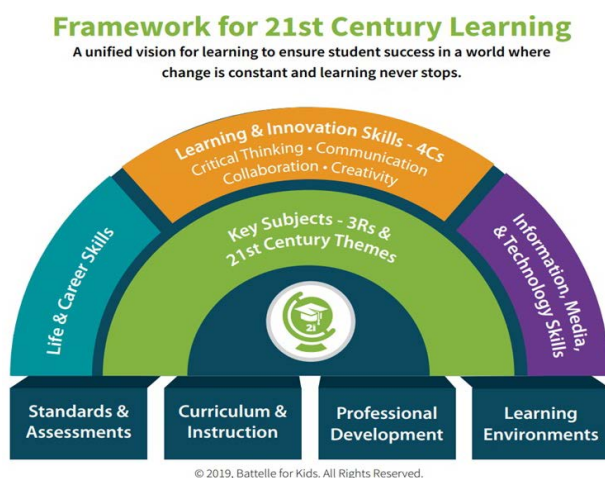


Figure 11. P21's frameworks for 21st century learning (Source: The Partnership for 21st Century Learning, 2019).

Amid this variation, select states and districts have assembled curricular guides and materials that highlight 21st-century skills, integrating these competencies into state educational outlines and incorporating teaching approaches for these skills into professional development initiatives for educators (Adamson & Darling-Hammond, 2014). Two significant initiatives in this area of competency reform, highlighted by Anderson-Levitt (2020) and Adamson & Darling-Hammond (2014), are the Partnership for 21st Century Learning (P21) and the Common Core State Standards (referred to as Common Core). While the Common Core has been discussed earlier, P21 emerges as a unique collaboration, initiated by technology firms like Apple and Microsoft, alongside the US Department of Education, and boasts 22 state members as partners by 2018 (Anderson-Levitt, 2020). Supported by a coalition of business, educational leaders, and policymakers, strives to enhance the 21st-century preparedness of K-12 students, P21 positions itself as a leading force in this endeavor, heralding the 4Cs (Critical Thinking, Communication, Collaboration, and Creativity) and crafting the Framework

for 21st Century Learning (**Figure 11**). This framework has guided thousands of educators and numerous schools domestically and internationally towards centering education around 21st-century skills (**Battelle for Kids, n.d.**). Nonetheless, due to the historically decentralized education system in the United States and the lack of emphasis on 21st-century skills in mandatory testing, the prominence of such skills in national discussions and certain curriculum documents has not consistently manifested in classroom practices (**Adamson & Darling-Hammond, 2014**). **Anderson-Levitt (2020)** also maintains that the Common Core, viewed as a “competency-added reform,” was “a late, partial, and silent policy” for implementing 21st-century skills in the United States. This initiative, along with the multi-state effort to introduce “new science standards”, fails to highlight key competencies such as creativity and innovation, collaboration, or life skills (**Adamson & Darling-Hammond, 2014**).

To analyze how a leading state (in public education) shapes and implements creativity education policy, Massachusetts presents a compelling case study. Ranked as the most educated state by Scholaroo and WalletHub in 2024, and second in PK-12 Education by USNews in 2023, Massachusetts showcases its strong commitment to education across all stages—from enrollment and standardized testing to graduation rates and college readiness (**Scholaroo, 2024; US-News, 2023; WalletHub, 2024**). Additionally, Massachusetts students consistently score among the highest on National Assessment of Educational Progress (NAEP) assessments in the last decades, showcasing its sustained achievement in education (**Larkin, 2022**). The analysis “Mapping the Landscape of Teaching and Learning for the Twenty-First Century in Massachusetts in the Context of US Educational Reform” by **Reimers & Chung (2019)** highlights Massachusetts as a focal point due to its superior educational outcomes and the state’s pivotal role in policy development and execution, reflecting the broader U.S. emphasis on state and local governance in education. This book chapter initially outlines Massachusetts’s success, linking it to reforms like the 1993 Massachusetts Education Reforms Act (MERA) and the Massachusetts Comprehensive Assessment System (MCAS), as well as nation-wide efforts including Common Core and PARCC (Partnership for Assessment of Readiness for College and Careers), though it suggests these reforms may have inadvertently tempered efforts to enhance 21st-century skills. Then, the study by **Reimers & Chung (2019)** examines Massachusetts’s integration of 21st-century skills into education through three lenses: interviews with educational leaders, state curriculum mapping, and early dialogues on skill development without substantial implementation. Firstly, the leaders acknowledged these skills’ significance for students’ future roles yet noted their minimal presence in K-12 education, overshadowed by core subjects like English and math. Secondly, the curriculum’s focus remains on knowledge, with creativity featured in only 6 of 1015 curriculum segments of English, math, science, and social studies of the state’s high school standard. Despite a 2008 white paper by a task force of 22 leaders in education, business, and civic sectors

outlining key recommendations for 21st-century skills in Massachusetts, including curriculum integration, teacher training, and assessment updates, these initiatives struggled to materialize due to insufficient political and financial backing. This occurred even though Massachusetts had been a member of P21, the Partnership for 21st Century Learning, since 2007 (ibid). Recently, commissioner Jeff Riley’s vision for Massachusetts public schools (Riley, 2019) emphasizes “Deeper Learning for All”, defined by the Department of Elementary and Secondary Education (DESE) as “an immersive experience where students build knowledge, produce authentic work, and develop 21st-century skills!” (DESE, n.d.). They also explain in more detail that Deeper Learning “is cultivated by engaging students with grade-level work that is relevant, real-world, and interactive and emerges at the intersection of **mastery, identity, and creativity** as three observed outcomes of learning.” (DESE, 2023b; Figure 12).

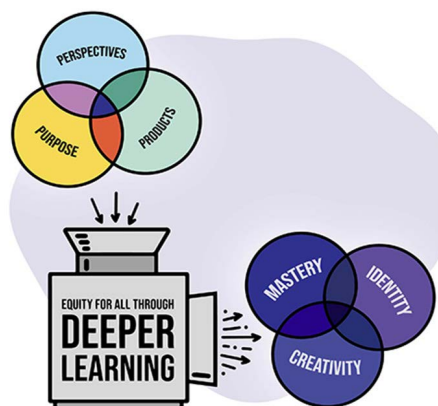


Figure 12. Planning for deeper learning (Source: Massachusetts Department of Elementary and Secondary Education (DESE, 2023a)).

To cultivate this, DESE (2022) launched the Kaleidoscope Collective for Learning, providing flexibility and support for schools and districts to implement Deeper Learning models (Mehta and Fine, 2015). This network encompasses diverse cohorts:

- **Cohort 1 (Pilot):** Cohort 1, initiated in January 2020, included 21 schools advancing their innovative Deeper Learning practices.
- **Cohort 2 (Boston Public Schools):** A 5-year partnership involving 15 schools to engage in Deeper Learning and provide feedback on Kaleidoscope resources.
- **Kaleidoscope Educator Network:** Launched in Fall 2022, the Kaleidoscope Educator Network aims to enhance the use of high-quality instructional materials across Massachusetts schools through Deeper Learning and professional development. The network features educators, including finalists from the State Teacher of the Year contest, from various districts seeking to transform teaching practices.

To address the vision outlined by Commissioner Jeff Riley for Massachusetts public schools, the question posed by the Center for Education Policy and Practice at the Massachusetts Teachers Association—whether schools in the state will “reach new heights or just leave us seeing stars?” (Center for Education Policy and Practice, 2019)—is pivotal. This inquiry not only seeks to evaluate the current state of educational advancement in Massachusetts but also emphasizes the importance of further nurturing creativity, deeper learning, and 21st-century skills. It underscores the need for ongoing assessment and enhancement of these critical areas to fulfill the Commissioner’s vision for future generations.

Another approach, focusing on creativity in gifted education, could offer a unique lens to examine the institutional framework of education policy in creativity. Since Sidney Marland’s foundational federal report on gifted education in 1972 (as cited in Matthews, 2015), creativity and creative thinking have consistently been recognized as essential traits of gifted students. The Elementary and Secondary Education Act defines gifted and talented individuals as possessing outstanding abilities in areas such as intellect, creativity, artistry, and leadership, necessitating superior educational support. This definition, specified in Title IX, Part A, Definition 22 (2002), is broadly accepted across many states and districts, emphasizing the critical need for specialized support to nurture these skills (National Association for Gifted Children (NAGC), n.d.). In the 2020-2021 State of the States in Gifted Education survey, of 52 respondents, 46 acknowledged a state-specific definition of giftedness, with 31 including creativity or creative thinking in their definitions. A majority of respondents (41) indicated that Local Education Agencies (LEAs) must comply with their state’s definition of giftedness and are legally or through regulations required to identify gifted and talented students within their areas (Rinn, Mun, & Hodges, 2022).

Regarding services/programs for the gifted and talented, 22 states reported that creativity-focused programs are either compulsory (7 states) or provided (15 states). However, the data suggest that in at least one-third of these instances, there is an absence of accountability or clear understanding of the actual programs offered locally. Additionally, fewer than half of the states involved have the ability to assess the effectiveness of the programs their districts provide (Matthews, 2015). By 2021, of 52 respondents, only 28 reported that their state has laws or regulations mandating gifted programming options/services, while 24 disclosed their state does not have such requirements (Rinn et al., 2022).

4.2. Practices of Creativity Education in the United States’ PK-12

As mentioned, given the federal government’s limited capacity to directly influence educational practices, and considering that most states have yet to fully embrace twenty-first-century skills in their standards, curricula, assessments, and professional development programs (Russell et al., 2023), there still exists considerable opportunity for the growth of creativity education practices in the United States, a nation with one of the most complex education systems in the

world. In line with this, we will present several examples on a case-by-case basis to illustrate these opportunities.

4.2.1. Creativity in Gifted Identification and Programming in Alabama

In Alabama, “a pilot study” (Matthews, 2015) identified programming specific to creativity in the gifted curriculum across several school districts. Key findings include some evidence:

1) Mobile County Public School System: Introduced the PACE Program (Pursuing Academics, Creativity, and Excellence), initiated in 1982, which emphasizes creative thinking, critical thinking, discipline methodologies, and research skills across all content areas. The services, designed for gifted students, “are applied in all content areas.”

2) Shelby County: Offers a weekly Gifted Resource Class (GRC) for identified gifted students in grades 3 - 5, providing a differentiated/concept-based curriculum that includes activities to develop thinking skills and creativity training among ten areas listed.

3) Jackson Public School District: The Instructional Management Plan for “Open Doors”, a program for intellectually gifted students (grades 2 - 8), includes Creativity and Creative Problem Solving as instructional strands. It aims to teach creative thinking skills, with outcomes such as demonstrating components of creative thinking (fluency, flexibility, originality, and elaboration) and generating creative products and productions.

Despite uncovering certain evidence, the findings showed a varied amount of information at the district level online, with detailed accounts in both creativity and leadership areas being rare. The study also highlighted a drawback of the strong focus on local governance in U.S. education policies: it can result in inconsistencies in implementing various facets of gifted education, including providing comprehensive details about the range of gifted services available in district schools (ibid).

4.2.2. Art Education in Illinois, Iowa, and Minnesota

The prevailing mindset closely associates creativity with art education. An Adobe (2012) survey of 1000 U.S. employees aged 25 or older, all college-educated and working full-time, found that art courses, with a 79% response rate, was the most influential in fostering creative thinking, ahead of science (69%) and math (59%). Additionally, scholarly research like Luftig’s (2000) study underscores the impact of art education on enhancing creative thinking, as shown by the Torrance Tests of Creative Thinking. Students involved in the SPECTRA+ (an arts infusion program) notably excelled in creativity and originality compared to their peers in control groups (Luftig, 2000).

Grodoski (2015) investigates an intriguing approach to creativity, policy, and practice in art education across Illinois, Iowa, and Minnesota. Highlighting the absence of explicit federal or state policies on creativity or art education in the U.S., the study delves into the translation of policies into practical classroom ac-

tivities. It emphasizes the pivotal role of non-governmental organizations (NGOs) and philanthropic groups in this process:

1) Illinois: An informal network led by Arts Alliance Illinois, in collaboration with philanthropic organizations, facilitated the adoption of the National Arts Standards.

2) Iowa: Iowa's support for arts and art education, mostly external to formal policy and lacking philanthropic support, prompts organizations like Arts Educators of Iowa to create visual arts guides that align with policy priorities.

3) Minnesota: A robust network of NGOs and philanthropic organizations fosters knowledge exchange and policy consistency.

Grodoski emphasizes that this approach is "neither a top-down nor a bottom-up model, but instead a middle-out and outside-in model," highlighting the power of collaborative efforts beyond traditional education hierarchies (ibid).

4.2.3. Commercial and Competitive Programs

As a leading nation that fosters private initiatives, the U.S. has seen a flourishing of commercial and non-public ventures in education, particularly in fostering creativity. This diversity is mirrored in the range of examples Starko (2018) presents, showcasing at least 8 commercial programs and interscholastic competitions aimed at bolstering creative thinking: 1) Future Problem Solving Program International; 2) Destination ImagiNation; 3) Odyssey of the Mind; 4) Inventing and Invention Conventions; 5) Science Olympiad; 6) Science Fairs in Cyberspace; 7) Makers and more initiatives; 8) A range of commercial books, kits, apps, and other resources:

1) Future Problem Solving Program International

The Future Problem Solving Program International (FPSP, 2024), founded by Ellis Paul Torrance in 1974, is globally recognized for its innovative approach to education and creativity. This program invites students to engage in Creative Problem Solving (CPS) by envisioning solutions to future challenges. It includes both competitive and noncompetitive formats, aimed at developing critical and creative thinking skills across a broad range of topics including business & economics, science & technology, and social & political issues. These topics remain consistent worldwide each academic year to foster a global educational environment.

FPSP starts by allowing students to choose their preferred programs, such as Global Issues, Community Problem Solving, Scenario Performance, or Scenario Writing. An FPS coach, who can be a parent, an experienced FPS participant, or a teacher, is essential for registering students and facilitating access to materials and support, including virtual learning resources. The program is structured to provide practice topics before moving on to competitive ones, culminating in opportunities to participate in regional, state, or national finals, and potentially the International Conference. This event offers a platform for students to compete and collaborate internationally.

With a focus on practical engagement, FPSP's curriculum includes Ac-

tion-Based Problem Solving for younger students and Scenario Writing for those interested in futuristic narratives. Scenario Performance and Community Problem Solving further apply CPS to storytelling and local community issues, respectively. FPSPI aligns with key educational standards globally, including ESSA, the Australian and New Zealand Curriculums, 21st Century Skills, PISA, the International Baccalaureate Programme, and the NAGC (National Association for Gifted Children) Programming Standards. This ensures its relevance across various educational systems and supports the development of essential skills for the 21st century.

Attracting over 30,000 K-12 students annually across at least 34 states in the United States and 14 countries over the last decade, FPSPI has proven its extensive reach and impact. It prepares students to tackle future challenges, fostering their development as effective problem solvers, creative thinkers, and responsible global citizens. For additional details, visit the FPSPI website at <https://www.fpspi.org/> (Referencing from *Future Problem Solving Program International (FPSPI)*, 2024; <https://www.fpspi.org/> and Starko, 2018).

2) Destination Imagination

Destination Imagination (DI) is committed to inspiring and equipping young people to become innovators and leaders through the creative process. Annually, DI engages over 30,000 students ranging from pre-K through university level across 40 states in the U.S., 6 Canadian provinces, and 27 countries across six continents. The program offers STEAM-based (Science, Technology, Engineering, Arts, and Mathematics) challenges and educational opportunities that foster unique, creative solutions. DI provides a diverse array of project-based learning experiences designed to meet the varied needs of students, educational institutions, and communities.

The cornerstone of DI is the Challenge Experience, catering to students from pre-K to university. Teams tackle STEAM project-based challenges, creating solutions that they present at live tournaments. The challenges, serving as creative prompts, are intentionally open-ended to encourage creativity and complete ownership of their solutions by the teams. These challenges aim to teach and apply the creative process, a fundamental system for innovation and bringing ideas to fruition.

Teams, consisting of 2 to 7 members, collaborate to devise a solution to one of the Team Challenges, ensuring that their solution is entirely their own work, with strictly no external interference. Teams are categorized by grade or age into five levels: Early Learning (non-competitive) and Elementary, Middle, Secondary, or University Levels (competitive).

A Team Manager, typically an adult such as a parent or teacher, guides the team through the creative process and organizational aspects without influencing the team's solutions. Team Managers are supported with resources, including a roadmap and access to online learning modules, to assist in their role. In addition, DI Affiliates may provide training for Team Managers, which can be in-person or virtual, depending on the geographic location.

DI teams form and start their projects between August and January, spending two to six months on their Team Challenge solutions and practicing for Instant Challenges. The season, aligned with the Northern Hemisphere's academic calendar, culminates in local tournaments held from February to April. Teams that advance qualify for the Global Finals, extending their season into May (referencing from <https://www.destinationimagination.org/>).

Starko (2018) highlights the distinct appeal and student profiles of Destination Imagination and FPSPI, underscoring their shared emphasis on divergent thinking but different challenge nature. FPSPI is favored by students skilled in research and communication, often integrated into social studies. Conversely, Destination Imagination attracts those inclined towards hands-on problem solving or the arts, appealing to tinkerers and performers who thrive in creative and dramatic expression.

3) Odyssey of the Mind

Odyssey of the Mind (OM) is a global creative problem-solving competition that engages students and community members of all ages. It is built on the foundation that creativity can be nurtured and that learning should be an enjoyable journey. OM caters to a broad range of participants, from those with innate creative talents to students discovering their unique capabilities. The program offers a nurturing platform for every participant to flourish.

Each year, OM challenges teams with five diverse long-term problems spanning technical, artistic, and classical categories. These problems encourage teams to innovate and prepare for months before competing. Teams, which can include up to seven members, are guided by an adult coach but are expected to develop their solutions independently. This process emphasizes creativity, teamwork, and practical skills like budget management.

The competition aspect of OM, while optional, provides a stage for teams to present their solutions and be evaluated on their creativity, adherence to the problem requirements, and overall impact. The competition features a spontaneous problem-solving challenge, adding an element of surprise and testing teams' quick-thinking abilities.

Reflecting its widespread appeal, OM's reach is extensive:

- Teams hail from nearly every state in the U.S. and around 25 other countries, showcasing the universal appeal of creative problem-solving.
- In 2017 alone, 833 teams participated, supported by 470 volunteers, with representation from 33 U.S. State Associations and 15 international countries. The Opening Ceremonies and Awards Ceremony attract between 13,000 to 18,000 attendees, including teams, parents, coaches, and volunteers, demonstrating the significant impact and positive force of OM in uniting people through creativity.

Since Dr. Micklus initiated the competition in 1978, OM has evolved into a significant event that champions the power of creative thinking globally. With its inclusive approach and emphasis on fun, educational experiences, Odyssey of the Mind continues to inspire and bring together individuals from diverse back-

grounds and skill sets (referencing from <https://www.odysseyofthemind.com/>).

4) Inventing and Invention Conventions

Investigating the journeys of both past and present innovators offers a valuable perspective on the invention process, as noted by Starko (2018: p. 200). Beginning with notable figures such as Edison, Henry Ford, and Bill Gates, The Henry Ford organization's website (<https://www.thehenryford.org/>) provides an extensive digital collection under the "Stories of Innovation" section, enabling visitors to trace the paths of America's most celebrated innovators through challenges to breakthroughs. This platform draws connections between diverse artifacts from The Henry Ford Archive of American Innovation™, offering insights into innovation from prominent American inventors.

Additionally, Starko (2018) highlights the "Fallonventions" segment on The Tonight Show, showcasing young inventors. While not regularly scheduled, these episodes available on YouTube feature school-aged inventors presenting their inventions, contributing to a broader understanding of the inventive process.

For more current innovation exposure, The Henry Ford's Innovation Nation, an Emmy®-winning series airing Saturdays on CBS, delves into contemporary innovators addressing today's challenges, with a segment dedicated to The Henry Ford's contributions to innovation. Episodes are available on YouTube (<https://www.youtube.com/@InnovationNation>), providing nearly weekly updates on various aspects of innovation, including stories of accidental discoveries and youth contributions to technology.

Beyond mere inspiration, Invention Conventions offer a platform for young inventors, particularly K-12 students, to showcase their innovations, receiving feedback and potentially gaining support (Zheng, n.d.). Since its inception in Connecticut in 1983, the model has expanded to at least 23 states, according to Invention Convention Worldwide (n.d.). These conventions culminate in the US Nationals, organized by The STEMIE Coalition, now part of Invention Convention Worldwide under The Henry Ford, emphasizing problem-solving, entrepreneurship, and creativity. Annually, over 166,000 K-12 students across the U.S. engage in these programs, fostering a vibrant community dedicated to nurturing the next generation of inventors (The Henry Ford, 2023).

5) Science Olympiad

Starko (2018: p. 201) highlights the Science Olympiad (<https://www.soinc.org/>) as an avenue for fostering creativity in students, despite it not being explicitly aimed at enhancing creative thinking. The program offers a plethora of opportunities for students to apply their creativity, particularly in the realm of science. For younger students in K-6, the Elementary Science Olympiad (ESO) offers formats like competitive tournaments, engaging science Fun Days, or informative Science Olympiad Fun Nights. For older students in grades 6 - 12, participation resembles that of a sports team, with dedication, coaching, and year-long practice. Teams, which consist of 15 students, prepare for various events, catering to their diverse talents. Larger clubs may include a

mentorship system due to their size. Currently, around 8000 teams from secondary schools across all 50 states engage in the Olympiad, alongside over 10,000 elementary schools organizing their own events or tournaments, according to *Science Olympiad* (n.d.).

6) Science Fairs in Cyberspace

Science Buddies (<https://www.sciencebuddies.org/>) stands out as a premier online resource for Science Fair projects, offering over 1200 experiments accessible with everyday household items. As young scientists progress, Science Buddies also provides Science Kits, enabling hands-on learning with affordable, professional-grade materials. In 2021, the platform supported 17 million users, including students, parents, and teachers, through its website, partner sites, and YouTube (*Science Buddies*, 2021). At the time of writing, Science Buddies is hosting the 2024 Engineering Challenge: Rubber Band Car. This competition encourages worldwide participation, offering the chance to win \$10,000 in prizes through random drawings for eligible entrants. Participants are tasked with constructing a car powered solely by a rubber band, with the distance it travels and the efficiency of materials used to contribute to their overall score.

7) Makers and More initiatives

Starko (2018: p. 202) also showcases programs like Maker Corps (makered.org), the DIY Maker program (diy.org), and Maker Faires (makerfaire.com) that propel young individuals into the maker culture. These initiatives create forums for sharing, exhibition, and collaborative engagement in challenges, underscoring creative problem-solving across a broad spectrum, not limited to technology. Annually, *Maker Faire* (n.d.) draws 200,000 visitors to their flagship events in the Bay Area and New York. In 2017, the ecosystem expanded with over 190 “Mini Maker Faires” and larger events worldwide, in cities from Tokyo to Paris. Reflecting the movement’s impact, the U.S. is home to more than 2000 makerspaces and Fab Labs ((digital) fabrication lab) championing innovative community solutions (*Nation of Makers*, 2021). This movement was nationally acknowledged in 2014 with the White House Maker Faire, promoting STEM participation and local manufacturing. Furthermore, *Nation of Makers* (2021) annually organizes the Capitol Hill Maker Faire, presenting the movement’s influence to U.S. Congressional leaders and celebrating its contribution to fostering innovation and enhancing communities.

8) Other resources

Towards the conclusion of her discussion on Commercial and Competitive programs, *Starko* (2018: p. 203) draws attention to the wealth of resources aimed at boosting creativity, such as books, apps, and kits. “The Kid’s Invention Book” by *Erlbach* (1999), that delves into young inventors’ experiences and the invention process, and *Rory’s Story Cubes* (<https://www.storycubes.com/>)—a creative storytelling tool, serve as prime examples. The market is flooded with such resources, searchable under terms such as “Kid Invention” or “Creative Kids” on the platforms like the Amazon, Google and Apple stores, offering a plethora of options for parents and educators to foster creativity in children. For guidance

navigating this vast selection, consider Common Sense Media (<https://www.commonsense.org/>), which states that their editors review various media and educational materials (including 45,000 ratings of movies, TV shows, apps, games, books, and podcasts) for age appropriateness and quality, catering to children aged 2 - 18. A quick search on February 17, 2024 on their platform using “creativity” yielded 677 results, while “invention” produced 30, encompassing diverse resources such as clips, apps, tools, and articles.

5. Discussion

Exploring educational topics within the vast and complex U.S. education system poses significant challenges, particularly when addressing the integration of creativity in PK-12 education. As Russell et al. (2023) articulate, capturing the essence of 21st-century skills and learning nationwide is daunting due to the decentralized nature of American education. This study has attempted to provide a concise overview, or “snapshot,” of how creativity is currently addressed across various layers of the U.S. education system:

5.1. National and State Policy

- **National Silence:** Despite the ongoing discussions surrounding a “Creativity Crisis” and the dominance of standardized testing and curriculum, there is a noticeable absence of creativity in national education policies and initiatives.
- **Creativity’s Funding:** Although not explicitly labeled as such, creativity receives indirect support through federal and state resources that fund new assessment methods beyond standardized tests, in-school and out-of-school programs fostering creative skills, and gifted education programs.
- **Implementation Gap:** Even in high-performing states like Massachusetts, public initiatives specifically dedicated to creativity education lack clear success. The intentions behind these initiatives are well-meaning, but their translation into effective policy and action is often sluggish and fraught with challenges. Moreover, state education departments, while emphasizing 21st-century skills, frequently overlook creativity, as evidenced by the lack of mention in Indiana’s GPS program and North Carolina’s essential skills list for high school graduates. Similarly, at the district level, variations are evident. South Sanpete School District in Utah, for instance, focuses on six competencies, omitting creativity, which is included in the state’s vision (South Sanpete School District, n.d.).

5.2. Grassroots Initiatives Fuel Creativity Practices

- **Flourishing Practices:** Creativity thrives under various programs and labels such as well-rounded education, deeper learning, art education, maker education, STEM/STEAM education, invention education, competency-based education, 21st-century skills, college and career readiness, student-centered learning, out-of-school time programs, and pedagogy of play.
- **Non-governmental Influence:** Private and non-governmental organizations

play a significant role in fostering creativity, often filling the gaps left by formal policies. These organizations have a profound impact on policy and practice creation, echoing Grodoski's (2015) observation about their crucial role beyond traditional art education.

As stated, the research revealed that while some states and districts have made notable advances in integrating creativity into their educational frameworks, a comprehensive national strategy remains elusive. This disparity often leaves creativity education dependent on localized efforts rather than a standardized national approach. The exploration of various educational policies and practices, alongside the dynamic roles played by private sector, NGOs and state initiatives, shows a landscape rich in diversity but fragmented in execution.

Looking forward, it is imperative that policymakers and educational leaders consider more robust integration of creativity into the national education standards. There is a clear need for systemic changes that prioritize creativity alongside core academic skills. This integration could be facilitated through the development of clear policy guidelines that encourage and require the incorporation of creativity in all aspects of PK-12 education.

6. Conclusion

Despite the absence of explicit mentions in national policies and the ongoing debates surrounding the "Creativity Crisis", this research uncovers several creativity-related initiatives supported by federal and state resources. Notably, non-governmental actors play a crucial role in promoting creativity across the PK-12 landscape. These practices, primarily operating outside the domain of formal policy, utilize a variety of approaches, highlighting the diverse methods used to foster student creativity. These elements contribute to a more comprehensive understanding of the entire ecosystem of creativity education in the U.S. PK-12 system, revealing complexities and grassroots initiatives, and possibly the implicit support for creativity within the education system, such as an "underlying culture" that supports creative output in school settings (Plucker et al., 2015), which may not be easily identifiable in official records. These insights promise valuable directions for further study. Subsequently, this paper will delineate the limitations of the current study and propose recommendations for future research endeavors.

6.1. Limitations

This study acknowledges two key limitations: time constraints and the inherent complexity of the U.S. education system. Understanding these constraints, it's important to regard this work as an initial "snapshot". Similar to the analogy of blind men and the elephant (Kleineberg, 2013), our perspective is naturally limited by the few lenses through which we can perceive facts in comparison to the needs. For example, this study excludes a deeper exploration of STEM/STEAM policies and practices, despite their potential to nurture creativity, as

noted by [Aguilera and Ortiz-Revilla \(2021\)](#). Additionally, the study only briefly mentions promising areas like invention education and the maker movement, although their hands-on approaches and emphasis on the creative process and product warrant further investigation.

6.2. Future Research Recommendations

Given the diverse education landscape, several approaches could be considered for future research:

- **Whole-system study:** Following [Plucker et al.'s \(2015\)](#) framework ([Table 5](#)), research could examine each or all intervention, assessment, and evaluation components across various educational contexts (classroom to national level) to understand their impact on student creativity.

Table 5. What do we need to do?

Education Level	Intervention	Assessment	Evaluation
P-12 Classroom	Make classroom settings more inviting for creative input and thinking; embed creativity within the classroom culture	Develop and/or use formative, curriculum-based assessments of creativity; regularly assess student's creative growth and report the results to parents	Promote and incorporate student creativity outcomes in curriculum and instruction
School	Develop common vision, plan and strategy for incorporating creativity into teaching and learning; build staff capacity and support innovative teaching practices that develop creativity	Incorporate creativity into the students' assessment portfolio; encourage teachers to assess student's creative growth as regular part of the evaluation and reporting process	Embed creativity within the underlying culture of the school and make sure learning spaces support creative output
Out-Of-School	Incorporate creativity into programs, activities and support services; support building staff capacity through professional development, etc.	Encourage measurement of students' creative growth as integral part of desired 21st century outcomes	Evaluate the extent to which programs, activities, services, spaces and culture support creativity; redesign learning/activity environment as needed
School District	Provide professional development and resources to schools regarding creativity intervention practices	Develop and support the use of high-quality creativity assessments in schools as part of the district's assessment plan	Determine how resources are used to promote creativity boosting learning spaces and learning culture; allocate resources as needed
State	Develop or make available professional development and curriculum that build capacity for incorporating creativity into teaching and learning	Encourage the use of high-quality creativity assessments at appropriate levels	Support the incorporation of teaching practices and learning environments that promote creativity
National	Devote resources to support creativity research, interventions, and assessments	Support development of high quality, creativity assessments at all levels	Fund development, pilot implementation, and evaluation of creativity interventions

(Source: [Plucker et al., 2015](#)); Note: Based on [Table 1](#) in the source document ([Plucker et al., 2015](#)), I have rearranged the content of each box into a more logical column while retaining all original text as sourced.

- **Zooming in:** Focusing on specific programs/approaches like STEM/STEAM, gifted education, invention education, or the maker movement, either within specific states/districts or by comparing them, could offer deeper insights into their impact on creativity using both qualitative and quantitative methods.
- **Equity considerations:** Exploring the powerful role of “practices” over “policies” within the U.S. education system should also include an equity lens. Research could investigate how students from diverse backgrounds access these valuable opportunities, considering resource availability, time commitment, and parental involvement, particularly for out-of-school activities.
- **Tracking the allocation of federal and/or state public grants** to programs and initiatives fostering creativity would offer another fruitful lens for exploration, with valuable data readily available. Such investigations could reveal:
 - ❖ **Areas of Priority:** Which types of creativity programs receive the most funding, suggesting priorities within the education system.
 - ❖ **Funding Distribution:** Whether resources are spread evenly across different regions, demographics, or program types.
 - ❖ **Impact Analysis:** Analyzing the correlation between funding levels and reported outcomes related to student creativity.
 - ❖ **Policy Effectiveness:** Evaluating whether funding aligns with stated policies and goals for fostering creativity in education.
- **International comparison:** An international comparative approach examining how different countries approach and address creativity education (definition, vision, strategy, curriculum, assessment, teacher training, and non-governmental collaboration) would offer valuable insights.

Overall, this research provides a valuable starting point for understanding the current state of creativity education in the U.S. The recommendations offer actionable steps for future research to deepen our understanding, identify successful practices, and ultimately ensure equitable access to creativity-fostering opportunities for all students.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

- Abadzi, H., Martelli, M., & Primativo, S. (2014). *Explorations of Creativity: A Review for Educators and Policy Making*. Qatar Foundation.
- Adamson, F., & Darling-Hammond, L. (2014). Policy Pathways for Twenty-First Century Skills. In *Assessment and Teaching of 21st Century Skills: Methods and Approach* (pp. 293-310). Springer.
- Adobe (2012). *Creativity and Education: Why It Matters*.
https://cdn.edex.adobe.com/static_page_assets/marketing-resources/assets/Creativity-and-Education-Infographic.pdf
- Aguilera, D., & Ortiz-Revilla, J. (2021). STEM vs. STEAM Education and Student Crea-

- tivity: A Systematic Literature Review. *Education Sciences*, 11, 331. <https://doi.org/10.3390/educsci11070331>
- Amadi, C. S. (2023). The Integration of 21st-Century Skills in Science: A Case Study of Canada and the USA. *Education and Urban Society*, 55, 56-87. <https://doi.org/10.1177/00131245211062531>
- Anderson-Levitt, K. (2020). 21st Century Skills in the United States: A Late, Partial and Silent Reform. *Comparative Education*, 57, 99-114. <https://doi.org/10.1080/03050068.2020.1845059>
- Ball, S. J. (1994). *Education Reform: A Critical and Post-Structural Approach*. Open University Press.
- Barbot, B., & Said-Metwaly, S. (2021). Is There Really a Creativity Crisis? A Critical Review and Meta-Analytic Re-Appraisal. *The Journal of Creative Behavior*, 55, 696-709. <https://doi.org/10.1002/jocb.483>
- Battelle for Kids (n.d.). *Frameworks & Resources*. <https://www.battelleforkids.org/networks/p21/frameworks-resources>
- Beghetto, R. A. (2017). Creativity in Teaching. In J. C. Kaufman, V. P. Glăveanu, & J. Baer (Eds.), *The Cambridge Handbook of Creativity across Domains* (pp. 549-564). Cambridge University Press.
- Beghetto, R. A., Kaufman, J. C., & Baer, J. (2014). *Teaching for Creativity in the Common Core Classroom*. Teachers College Press.
- Berland, E. (2013). *Barriers to Creativity in Education: Educators and Parents Grade the System*. Adobe System, Inc.
- Bolden, B., DeLuca, C., Kukkonen, T., Roy, S., & Wearing, J. (2020). Assessment of Creativity in K-12 Education: A Scoping Review. *Review of Education*, 8, 343-376. <https://doi.org/10.1002/rev3.3188>
- Bronson, P., & Merryman, A. (2010). *The Creativity Crisis*. <https://www.newsweek.com/creativity-crisis-74665>
- Center for Education Policy and Practice (2019). *Our Way Forward: Commissioner Riley's Kaleidoscope*. <https://thepolicyminute.com/2019/10/08/rileys-kaleidoscope/>
- Cremin, T., & Chappell, K. (2021). Creative Pedagogies: A Systematic Review. *Research Papers in Education*, 36, 299-331. <https://doi.org/10.1080/02671522.2019.1677757>
- DESE (2022). *Our Work*. <https://www.doe.mass.edu/kaleidoscope/our-schools.html>
- DESE (2023a). *Planning for Deeper Learning*. <https://www.doe.mass.edu/kaleidoscope/planning/default.html>
- DESE (2023b). *What Is Deeper Learning?* <https://www.doe.mass.edu/kaleidoscope/overview.html>
- DESE (n.d.). *Deeper Learning*. <https://www.doe.mass.edu/deeperlearning/>
- Di Battista, A., Grayling, S., Hasselaar, E., Leopold, T., Li, R., Rayner, M., & Zahidi, S. (2023). Future of Jobs Report 2023. In *World Economic Forum*. <https://www.weforum.org/reports/the-future-of-jobs-report-2023>
- El Maouch, M., Jin, Z., Zhao, K., & Zhang, Y. (2023). The "Creativity Crisis" as a Mind in Crisis: A Cultural-Historical Activity Theory Position. *Integrative Psychological and Behavioral Science*, 58, 433-461. <https://doi.org/10.1007/s12124-023-09808-6>
- Ellis, J., & Hart, D. (2023). Strengthening the Choice for a Generic Qualitative Research Design. *The Qualitative Report*, 28, 1759-1768. <https://doi.org/10.46743/2160-3715/2023.5474>
- English, D., Cushing, E., Therriault, S., & Rasmussen, J. (2017). *College and Career Rea-*

- diness Begins with a Well-Rounded Education: Opportunities under the Every Student Succeeds Act*. College & Career Readiness & Success Center at American Institutes for Research.
- Erlbach, A. (1999). *The Kids' Invention Book*. Lerner Publishing Group.
- Fairfax County School Board (n.d.). *Portrait of a Graduate*.
<https://www.fcps.edu/about-fcps/portrait-graduate>
- Florida, R. L. (2004). *America's Looming Creativity Crisis*.
<https://hbr.org/2004/10/americas-looming-creativity-crisis>
- Foster, N., & Schleicher, A. (2022). Assessing Creative Skills. *Creative Education*, 13, 1-29.
<https://doi.org/10.4236/ce.2022.131001>
- FPSPi (2024). *Celebrating 50 Years of Learning and Beyond*. Future Problem Solving Program International.
https://fpspi.org/wp-content/uploads/2024/05/FPS_50Year_Impact_Report_2024.pdf
- Glăveanu, V. P. (2014). The Psychology of Creativity: A Critical Reading. *Creativity: Theories Research Applications*, 1, 10-32. <https://doi.org/10.15290/ctra.2014.01.01.02>
- Grodoski, C. (2015). Creativity, Policy, and Practice in Three States: An Exploration of Definitions of Creativity among State Art Education Policies, the Life Contexts, and Professional Practice of Middle Level Art Educators. *Marilyn Zurmuehlen Working Papers in Art Education*, 2015, 1-13. <https://doi.org/10.17077/2326-7070.1488>
- Gruszka, A., & Tang, M. (2017). The 4P's Creativity Model and Its Application in Different Fields. In M. Tang, & C. H. Werner (Eds.), *Handbook of the Management of Creativity and Innovation: Theory and Practice* (pp. 51-71). World Scientific Publishing.
- Helding, L. (2011). Creativity in Crisis? *Journal of Singing*, 67, 597.
- Henriksen, D., Creely, E., & Henderson, M. (2019). Failing in Creativity: The Problem of Policy and Practice in Australia and the United States. *Kappa Delta Pi Record*, 55, 4-10.
<https://doi.org/10.1080/00228958.2019.1549429>
- Hopskin, R. (2018). *The Creativity Crisis*.
<https://www.resilience.org/stories/2018-09-24/the-creativity-crisis/>
- Indiana Department of Education (n.d.). *Indiana Graduates Prepared to Succeed (GPS)*.
<https://www.in.gov/doe/files/SBOE-Dashboard-Slides-10.13.21.pdf>
- Institute of Education Sciences (n.d.). *Measuring Original Thinking in Elementary Students: A Text-Mining Approach*.
<https://ies.ed.gov/funding/grantsearch/details.asp?ID=4477>
- Invention Convention Worldwide (n.d.). *Find a Local Program*.
https://inhub.thehenryford.org/icw/find_a_program
- Jahja, A. S., Sri Ramalu, S., & Razimi, M. S. A. (2021). Generic Qualitative Research in Management Studies. *JRAK (Jurnal Riset Akuntansi dan Bisnis)*, 7, 1-13.
<https://doi.org/10.38204/jrak.v7i1.523>
- Jones, S. D., & Workman, E. (2016). *ESSA's Well-Rounded Education*. Education Commission of the States.
<https://www.ecs.org/wp-content/uploads/ESSAs-Well-Rounded-Education-1.pdf>
- Kahlke, R. M. (2014). Generic Qualitative Approaches: Pitfalls and Benefits of Methodological Mixology. *International Journal of Qualitative Methods*, 13, 37-52.
<https://doi.org/10.1177/160940691401300119>
- Kaufman, J. C., & Beghetto, R. A. (2009). Beyond Big and Little: The Four C Model of Creativity. *Review of General Psychology*, 13, 1-12. <https://doi.org/10.1037/a0013688>
- Kettler, T., Lamb, K. N., & Mullet, D. R. (2021). *Developing Creativity in the Classroom:*

- Learning and Innovation for 21st-Century Schools*. Routledge.
<https://doi.org/10.4324/9781003234104>
- Kim, K. H. (2011). The Creativity Crisis: The Decrease in Creative Thinking Scores on the Torrance Tests of Creative Thinking. *Creativity Research Journal*, 23, 285-295.
<https://doi.org/10.1080/10400419.2011.627805>
- Kim, K. H. (2021). Creativity Crisis Update: America Follows Asia in Pursuing High Test Scores over Learning. *Roeper Review*, 43, 21-41.
<https://doi.org/10.1080/02783193.2020.1840464>
- Kleineberg, M. (2013). The Blind Men and the Elephant: Towards an Organization of Epistemic Contexts. *Knowledge Organization*, 40, 340-364.
<https://doi.org/10.5771/0943-7444-2013-5-340>
- Larkin, M. (2022). *Massachusetts Students' Scores on a National Reading and Math Exam Plummeted during the Pandemic*.
<https://www.wbur.org/news/2022/10/24/massachusetts-students-math-reading-scores>
- Larmer, J. (n.d.). *What Is a Portrait of a Graduate?*
<https://blog.definedlearning.com/what-is-a-portrait-of-a-graduate>
- Long, H., Kerr, B. A., Emler, T. E., & Birdnow, M. (2022). A Critical Review of Assessments of Creativity in Education. *Review of Research in Education*, 46, 288-323.
<https://doi.org/10.3102/0091732x221084326>
- Luftig, R. L. (2000). An Investigation of an Arts Infusion Program on Creative Thinking, Academic Achievement, Affective Functioning, and Arts Appreciation of Children at Three Grade Levels. *Studies in Art Education*, 41, 208-227.
<https://doi.org/10.2307/1320378>
- Maker Faire (n.d.). *Maker Faire—A Bit of History*.
<https://makerfaire.com/makerfairehistory/>
- Matthews, M. S. (2015). Creativity and Leadership's Role in Gifted Identification and Programming in the USA: A Pilot Study. *Asia Pacific Education Review*, 16, 247-256.
<https://doi.org/10.1007/s12564-015-9373-x>
- Mehta, J., & Fine, S. (2015). *The Why, What, Where, and How of Deeper Learning in American Secondary Schools*. *Students at the Center, Deeper Learning Research Series*. Jobs for the Future.
- NAGC (n.d.). *Glossary of Terms*. <https://nagc.org/page/glossary>
- Nation of Makers (2021). *Nation of Makers Impact Report—Our First 5 Years (2017-2021)*. <https://www.nationofmakers.us/5-year-impact-report>
- National Center for Education Statistics (n.d.). *Number of Operating Public Schools and Districts, Student Membership, Teachers, and Pupil/Teacher Ratio, by State or Jurisdiction: School Year 2018-19*. https://nces.ed.gov/ccd/tables/201819_summary_2.asp
- National Research Council (2011). *A Plan for Evaluating the District of Columbia's Public Schools: From Impressions to Evidence*. National Academies Press.
- National Research Council (2012). *Education for Life and Work: Developing Transferable Knowledge and Skills in the 21st Century*. The National Academies Press.
- North Carolina Department of Public Instruction (n.d.). *North Carolina Portrait of a Graduate*.
<https://www.dpi.nc.gov/documents/statesuperintendent/portrait-graduate/open>
- Norville, V. (2022). States Sketch "Portraits of a Graduate". *State Innovations*, 27, 1-4.
- OECD (2021). *PISA 2021 Creative Thinking Framework (Third Draft)*. OECD.
<https://www.oecd.org/pisa/publications/PISA-2021-creative-thinking-framework.pdf>

- OECD (2022). *Thinking Outside THE Box—The PISA 2022 Creative Thinking Assessment*.
- Office of Career, Technical, and Adult Education Virginia Department of Education (2020). *Work-Based Learning Guide*.
- Plucker, J. A., Beghetto, R. A., & Dow, G. T. (2004). Why Isn't Creativity More Important to Educational Psychologists? Potentials, Pitfalls, and Future Directions in Creativity Research. *Educational Psychologist, 39*, 83-96.
https://doi.org/10.1207/s15326985ep3902_1
- Plucker, J. A., Kaufman, J. C., & Beghetto, R. A. (2015). *What We Know about Creativity*. Partnership for 21st Century Skills.
- Puryear, J. S., & Lamb, K. N. (2020). Defining Creativity: How Far Have We Come since Plucker, Beghetto, and Dow? *Creativity Research Journal, 32*, 206-214.
<https://doi.org/10.1080/10400419.2020.1821552>
- Quigley, K. (n.d.). *A Comprehensive Guide to a Portrait of a Graduate*.
<https://www.panoramaed.com/blog/comprehensive-guide-portrait-of-a-graduate>
- Ramlackhan, K. (2024). Creativity and Critical Thinking in Online Learning: Addressing Social Justice, Equity and Inclusion in a Graduate Course in the United States. In N. Brown, A. Ince, & K. Ramlackhan, (Eds.), *Creativity in Education: International Perspectives* (pp. 113-131). UCL Press.
- Ravitch, D. (2016). *The Death and Life of the Great American School System: How Testing and Choice Are Undermining Education*. Basic Books.
- Reimers, F. M., & Chung, C. K. (2019). Mapping the Landscape of Teaching and Learning for the Twenty-First Century in Massachusetts in the Context of US Educational Reform. In F. M. Reimers, & C. K. Chung (Eds.), *Teaching and Learning for the Twenty-First Century: Educational Goals, Policies, and Curricula from Six Nations* (pp. 187-223). Harvard Education Press.
- Riley, J. C. (2019). *The Commissioner's Report to the Board: Our Way Forward for Massachusetts K-12 Public Education*.
<https://www.doe.mass.edu/bese/docs/fy2019/2019-06/item2.docx>
- Rinn, A. N., Mun, R. U., & Hodges, J. (2022). *2020-2021 State of the States in Gifted Education*. National Association for Gifted Children and the Council of State Directors of Programs for the Gifted.
https://cdn.ymaws.com/nagc.org/resource/resmgr/2020-21_state_of_the_states_.pdf
- Runco, M. (2015). *The Real Creativity Crisis. Creativity & Human Development*.
- Russell, M., Braun, H., & Zhu, B. (2023). Twenty-First Century Skills and Learning: A Case Study of Developments and Practices in the United States. In *Key Competences and New Literacies: From Slogans to School Reality* (pp. 257-294). Springer.
https://doi.org/10.1007/978-3-031-23281-7_10
- Scholaroo (2024). *Most & Least Educated States*.
<https://scholaroo.com/report/most-educated-states-us/>
- Schrage, M. (2010). *The Creativity Crisis? What Creativity Crisis?*
<https://hbr.org/2010/08/the-most-important-thing-to.html>
- Science Buddies (2021). *STEM: Building 21st Century Citizens: Annual Report 2021*.
<https://www.sciencebuddies.org/cdn/Files/18447/4/ScienceBuddies-Annual-Report-2021-220429.pdf>
- Science Olympiad (n.d.). *History*. <https://www.soinc.org/about/history>
- Scott, I. (2020). *A New PK-12 Education Ecosystem Framework for a New Normal*.
<https://www.sir.advancedleadership.harvard.edu/articles/a-new-pk-12-education-ecosy>

[stem-framework-for-a-new-normal](#)

- Skinner, R. R. (2022). *The Elementary and Secondary Education Act (ESEA), as Amended by the Every Student Succeeds Act (ESSA): A Primer*. CRS Report R45977, Version 6, Updated, Congressional Research Service.
- Smith, G. J. W. (2005). How Should Creativity Be Defined? *Creativity Research Journal*, 17, 293-295. <https://doi.org/10.1080/10400419.2005.9651487>
- South Sanpete School District (n.d.). *SSSD-Portrait of a Graduate*. <https://www.ssanpete.org/district-information/portrait-of-a-graduate.html>
- Starko, A. J. (2018). *Creativity in the Classroom: Schools of Curious Delight*. Routledge. <https://doi.org/10.4324/9781315391625>
- Sternberg, R. J., & Karami, S. (2022). An 8P Theoretical Framework for Understanding Creativity and Theories of Creativity. *The Journal of Creative Behavior*, 56, 55-78. <https://doi.org/10.1002/jocb.516>
- Taylor, R., Fadel, C., Kim, H., & Care, E. (2020). *Competencies for the 21st Century: Jurisdictional Progress*.
- The Henry Ford (2023). *Student Inventors Compete at the Henry Ford during Raytheon Technologies Invention Convention U.S. Nationals*. <https://inhub.thehenryford.org/icw/about/news/newsdetails/Detail/student-inventors-com-pete-at-the-henry-ford-during-raytheon-technologies-invention-convention-u.s.-nationals>
- The Partnership for 21st Century Learning (2019). *Framework for 21st Century Learning*. Battelle for Kids. https://static.battelleforkids.org/documents/p21/P21_Framework_Brief.pdf
- The Peter G. Peterson Foundation (2023). *How K-12 Education Funded?* <https://www.pgpf.org/budget-basics/how-is-k-12-education-funded>
- The Policy Circle (n.d.). *Education: K-12*. <https://www.thepolicycircle.org/brief/k-12-education-reform/>
- The U.S. National Science Foundation (n.d.). *Award Abstract # 1920653: Collaborative Research: Measuring and Enhancing Scientific Creative Thinking for STEM Education and Research: Classroom-Aligned Assessment and Network Neuroscience-Based Mechanisms*. https://www.nsf.gov/awardsearch/showAward?AWD_ID=1920653
- U.S. Department of Education (n.d.a). *About ED*. <https://www2.ed.gov/about/landing.jhtml>
- U.S. Department of Education (n.d.b). *The Federal Role in Education*. <https://www2.ed.gov/about/overview/fed/role.html>
- U.S. Department of Education, Office of Elementary and Secondary Education (2016). *Non-Regulatory Guidance: Student Support and Academic Achievement Grants*.
- UNESCO (2013). *UNESCO Handbook on Education Policy Analysis and Programming, Volume 1: Education Policy Analysis*.
- USNews (2023). *Pre-K-12*. <https://www.usnews.com/news/best-states/rankings/education/prek-12>
- Utah State Board of Education (n.d.). *Utah's Portrait of a Graduate*. <https://schools.utah.gov/portraitgraduate>
- Van Nuys, A. (2019). *New LinkedIn Research: Upskill Your Employees with the Skills Companies Need Most in 2020*.
- Vesely, A. (2012). A Conceptual Framework for Comparison of Educational Policies.

KEDI Journal of Educational Policy, 9, 323-347.

- Viennet, R., & Pont, B. (2017). *Education Policy Implementation: A Literature Review and Proposed Framework*. OECD Education Working Papers, No. 162.
- Vincent-Lancrin, S., González-Sancho, C., Bouckaert, M., de Luca, F., Fernández-Barrerra, M., Jacotin, G., Urgel, J., & Vidal, Q. (2019). *Fostering Students' Creativity and Critical Thinking: What It Means in School*. OECD Publishing.
<https://doi.org/10.1787/62212c37-en>
- Virginia Department of Education (n.d.). *Profile of a Virginia Graduate*.
<https://www.doe.virginia.gov/parents-students/for-students/graduation/policy-initiatives/profile-of-a-virginia-graduate>
- Voogt, J., & Roblin, N. P. (2012). A Comparative Analysis of International Frameworks for 21st Century Competences: Implications for National Curriculum Policies. *Journal of Curriculum Studies*, 44, 299-321. <https://doi.org/10.1080/00220272.2012.668938>
- Walker, T. (2016). *Goodbye "Core Subjects", Hello "Well-Rounded Education"*. The National Education Association (NEA).
<https://www.nea.org/nea-today/all-news-articles/goodbye-core-subjects-hello-well-rounded-education>
- WalletHub (2024). *Most & Least Educated States in America*.
<https://wallethub.com/edu/e/most-educated-states/31075>
- Zheng, A. (n.d.). *Invention Convention—Should You Participate?*
<https://www.lumiere-education.com/post/invention-convention-should-you-participate>