

## Teaching responsible creativity: a path to ethical innovation

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### Abstract

Education today is evolving to foster essential psychosocial skills like creativity, critical thinking, and responsibility, equipping students for 21st-century challenges. However, it is crucial to examine the motivations driving these changes and their alignment with broader societal goals beyond merely economic interests.

This article explores the ethical dimensions of creativity, recognizing its potential for both positive innovation and harm. It emphasizes the neutrality of creativity and the importance of evaluating the intentions and consequences behind creative acts, not just their outcomes. We introduce and define the concept of "responsible creativity," characterized by the ability to generate original ideas, behaviors, or objects while considering the moral and legal repercussions of one's actions, both in the present and future. This concept is anchored in the ethics of conviction and responsibility, promoting a fundamental commitment to avoid harm and enhance well-being. Our model of responsible creativity incorporates qualities such as benevolence, flexibility, positivity, reliability, accountability, reflexivity, and wisdom. We advocate for nurturing this type of creativity in educational settings through innovative approaches such as board and video games, philosophy workshops, wisdom education, and mindfulness meditation. These pedagogical methods aim to cultivate future leaders who are ethically aware and capable of using their creativity to positively impact society and the environment. By navigating the interplay of creativity and ethics, this article provides valuable insights and practical guidance for educators and policymakers striving to create a more ethically conscious and innovative educational landscape.

**Keywords** Creativity · Responsibility · Education · Ethics · Developmental psychology · Moral development · Educational psychology

### 1 Introduction: navigating the moral landscape of creativity, challenges and consequences in education and beyond

Craft [1] investigated the tensions, dilemmas, and potential limitations associated with fostering creativity in education. She also highlighted the ethical and moral dilemmas educators may encounter in a world prioritizing individual fulfillment and governed by the laws of the financial market, which extend to the realms of politics, wage labor, innovation, and entrepreneurship. This raises inquiries regarding the costs and nature of creativity: what innovations arise? What are the environmental and spiritual costs? Lastly, what about the negative externalities and malicious intentions in creativity?

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This article has been updated to correct the reference citations.

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McLaren [2] emphasized that "we tend to ignore the fact that much of human creative effort has been in the service of devious and violent projects" (p. 137). His exploration of the dark side of creativity underscores two key notions: that creativity can yield adverse effects and that it can serve malicious intent. McLaren contends that humanity has engaged in technological endeavors destructive to the environment, posing threats to life on the planet [2]. He provides numerous examples, such as the use of human skin by the Assyrians and Nazis for decorations and tools, the deployment of nuclear bombs in Hiroshima, abuses in gene therapy and organ transplants, technological exploitation for political propaganda and warfare, economic exploitation, and environmental destruction leading to increased cancer rates due to pesticides and radioactivity. According to McLaren, while technology and science have addressed some issues, they have also spawned new ones. He laments that societal responses to these issues remain superficial due to technological conditioning from an early age [2]. Despite the developmental contributions of creativity to humanity, McLaren contends that "science has not been an unqualified triumph" [2], p. 140. Consequently, he advocates for morality and rationality as primary objectives of creativity. However, morality remains a flexible concept, subject to change across socio-cultural contexts, potentially leading to conflicts with prevailing social norms. Thus, instead of solely focusing on morality, he claims attention should be directed towards intentionality. Hans Jonas, one of the twentieth century's greatest ethicists, also warned against the devastating ecological effects of technoscience, and therefore deleterious for future generations and thus promoted a principle of responsibility [3]. Now, Cropley et al. [4] define malicious creativity as "creativity that is deliberately planned to harm others" (p. 106), emphasizing its potential to benefit one party while adversely affecting another.

The authors also note that malicious intent extends to the commercial sector, competitions, and acts of terrorism. Ultimately, creativity remains neutral, necessitating scrutiny of intentions and consequences, as "creativity, whether benevolent or malicious, is a competitive lever that does not respect social conventions" [4], p. 114. Individuals with antisocial intentions may express creativity regardless of societal approval, often leading to societal labeling and consequences, as observed in historical figures like Galileo, Martin Luther King Jr., and Henry David Thoreau (Brower [5]). Brower [5] contends that creativity involves two struggles: "the struggle for acceptance of one's ideas and the intrapsychic struggle for order". Additionally, Brower suggests that extraordinary creativity demands extraordinary courage to pursue visions amidst criticism and oppression, evident throughout history in various societies, cultures, and religions. To evaluate the benevolence or malevolence of creativity, Hao et al. [6] developed a scale of malevolent creativity comprising three dimensions (harming others, lying, manipulating) and 13 Likert-scale items. Recently, Lebeda et al. [7] conducted a meta-analysis on the relationship between creativity and the dark triad of personality—narcissism, Machiavellianism, and psychopathy—finding statistically significant associations between the former two and creativity.

Although Lubart et al. [8, 9] denote "a state of uncertainty in a creative process, a state in which multiple possibilities are still open to exploration" (p. 1). Viewing creativity dynamically parallels the scientific investigation process, necessitating the transcendence of existing knowledge boundaries. By engaging with this dynamic state and purpose of creativity [10], it becomes conceivable to harness its positive potential. Furthermore, Glaveanu et al. [11] assert that creativity is a psychosocial, material, and relational phenomenon reliant on the opinions, knowledge, and expectations of others. It holds significant implications for society, capable of precipitating paradigm shifts that alter our worldviews. Furthermore, Glaveanu et al. [11] describe creativity as a psychosocial, material, and relational phenomenon that depends on the opinions, knowledge, and expectations of others. This phenomenon is also significant for society, as it can lead to paradigm shifts that transform our worlds, and for researchers who share the responsibility of building more inclusive, tolerant, and sustainable societies.

Vincent [12] observes that within corporate environments, companies cultivating creative identities may inadvertently foster entitlement, leading to dishonesty, selfishness, reduced helping behaviors, and even aggression. Consequently, the value of promoting a creative identity in this context comes into question due to its potential for malignancy. James and Taylor [13] delineate positive creativity as "the production of beneficial products (concrete or abstract) by new means" (p. 34), contrasting it with negative creativity, characterized by creators motivated to "harm, hinder, harass, destroy, or gain an unfair or undeserved advantage" (p. 37). Cropley [14] argues that understanding the essence of creativity aimed at causing harm necessitates examination of the product, person, process, and press concurrently. Cropley [15] further delves into the distinction between legality and ethics in artistic and engineering frameworks, addressing the "freedom versus compulsion" debate through the utilitarian assessment of inventions. The paradox inherent in the tension between the desire for freedom and the demand for constraint can be resolved through a nuanced understanding of constraint. Finally, Cropley [16] differentiates between malicious creativity, arising from intentionally harmful effective novelty, and failed benevolence, representing unintentionally or accidentally malicious creativity.

## 2 Methods

In this article, we adopt a theoretical and analytical approach to explore and define the concept of responsible creativity and its potential across various societal domains, particularly education. Our analysis is grounded in a review of secondary literature, including academic research, global policy documents, and expert contributions in the fields of creativity, education, and ethics. This work is guided by a critical and ethical perspective that acknowledges the complexity of creativity and its societal impact, embracing a broad definition that encompasses moral, social, and environmental implications. By integrating concepts such as responsibility, sustainability, and wisdom, we seek to highlight the positive facets of creativity and identify ways to cultivate them in diverse contexts.

We focus on global policy literature related to creativity, education, and social responsibility due to its significance in shaping policy agendas and educational programs. This approach allows us to explore current trends and initiatives, as well as the challenges and opportunities associated with promoting responsible creativity in various cultural and socio-economic contexts. Additionally, these texts can inform and support educational initiatives aimed at developing this skill.

Following the literature review, we formalize the new model of Bright Creativity, which serves as the theoretical framework for our analysis. This model outlines the key principles, components, and implications of responsible creativity.

Building on this theoretical foundation, we explore practical strategies for fostering responsible creativity in educational settings. Specifically, we examine psycho-education initiatives aimed at cultivating creative thinking and ethical decision-making among students. By integrating theoretical insights with practical applications, we offer actionable recommendations for educators and policymakers seeking to promote responsible creativity in schools.

### 2.1 The evolution of international institutional prescriptions concerning the skills to be developed: towards a 21st-Century learning paradigm that integrates creativity... and responsibility?

Over the past three decades, a global movement stemming from various sources, including industry and governments, has been mobilizing with a seemingly noble objective: envisioning and formalizing 21st-century education [17–20]. The United States Department of Labor published a report in 1991 titled “What Work Requires of Schools”, which boldly stated in a letter addressed to parents, employers, and educators: “All American high school students must develop a new set of skills and basic competencies if they want to lead a productive, fulfilling, and satisfying life” [21], p. i, aiming to make businesses “more competitive” by transforming schools into “fully performing organizations” [21], p. ii. The U.S. Department foresaw the need for students to develop three types of skills by the 2000s: basic skills (reading, writing, arithmetic, mathematics, speaking, and listening), thinking skills (creative thinking, decision-making, problem-solving, imagination, learning, and reasoning), and personal qualities (individual responsibility, self-esteem, sociability, self-management, and integrity) [21], p. iii.

In 1993, the World Health Organization (WHO) proposed contributing to the development of life skills education, defined as “adaptive and positive behavioral abilities that enable individuals to effectively cope with the demands and challenges of daily life” [22], p. 1. These life skills are the components of the “psychosocial competence” [23], p. 1, which plays a significant role in “physical, mental, and social wellbeing” [22]p. 1. Thus, WHO suggested integrating these ten skills (decision-making, problem solving, creative thinking, critical thinking, effective communication, interpersonal relationship skills, self-awareness, empathy, emotional coping, and stress management) as objectives into the curricula of children and adolescents [22], p. 1. Subsequently, numerous proposals were made in the French education system, as well as in healthcare and parenting practices, to integrate these skills into daily routines [23–28].

Moreover, during the G7 conference on the Information Society initiated by the European Commission on February 25 and 26, 1995, in Brussels, education was a prominent topic of discussion. Members of the European Round Table for Industry, an organization established in 1983 to promote competitiveness and prosperity in Europe, collaborated with the European Rectors’ Conference (CRE) to publish a report on European education titled “Towards the Learning Society” [29]. They issued a severe assessment, noting that current education “leads to the waste of human potential,” as “there is an increasing gap between the education people need in today’s complex world and the education they receive” [29].

Ultimately, they sounded an alarm and called for a profound transformation of national education systems, as they declared that the pace of change and transformation was too slow. The explicit goal of these industrialists was to create a learning society, educating citizens rather than robots, by establishing lifelong education with a European dimension to facilitate mobility. This initiative initially led to the development of “strategies to promote lifelong education, in harmony with other socio-economic policies” by the Education Directorate of the Organisation for Economic Co-operation and

Development [30]. Subsequently, it also led to the adoption of Recommendation 2006/962/CE [31] on key competences for lifelong learning by the European Parliament and Council, aiming to integrate eight competences into national public policies (communication in the mother tongue and foreign languages, mathematical, scientific, technological, and digital competence, social and civic competence, sense of initiative and entrepreneurship, cultural awareness and expression, and learning to learn) and the establishment of a common core of knowledge and skills in France [32].

In 2002, the U.S. Department of Education, along with corporations such as AOL, Apple, Cisco, Dell, Microsoft, later joined by Ford, Lego, Verizon, Lenovo, Oracle, Hewlett Packard, and others, established The Partnership for 21st Century Skills [33]. This partnership acknowledged "a profound gap between the knowledge and skills most students learn in school and the knowledge and skills they need in typical 21st-century communities and workplaces". They advocated for collaborative partnerships between education leaders, businesses, communities, and government to propose new foundations for K-12 school programs. These new teachings should be grounded in core subjects (English, language arts, world languages, arts, mathematics, economics, science, geography, history, government, and civics), themes (global awareness, financial, economic, business, and entrepreneurial literacy, civic literacy, and health literacy), learning and innovation skills (creativity and innovation, critical thinking and problem-solving, communication, and collaboration), information, media, and technology skills (information literacy, media literacy, and ICT literacy), and life and career skills (flexibility and adaptability, initiative and self-direction, social and cross-cultural skills, productivity and accountability, and leadership) [34]. This partnership, also known as P21, merged with the Battelle for Kids movement (a national non-profit organization committed to collaborating with school systems and communities to develop students' skills) in 2018 [35], and learning and innovation skills are now commonly referred to as the 4 Cs (Critical Thinking, Communication, Collaboration, and Creativity).

Other organizations have also contributed to defining the new competences to be cultivated in educational institutions. In 2014, the Qatar Foundation organized the World Innovation Summit for Education (WISE) and conducted a survey titled "School in 2030," consulting experts and professionals (teachers, associations, public institutions, and businesses) from around the world (Europe, Middle East, Asia, Oceania, Africa, North America, Latin America, and the Caribbean). The results underscored that online learning could become the norm and that personal and practical skills would outweigh academic skills [36]. A consensus among respondents was that 93% of them preferred schools implementing innovative methods based on new pedagogical approaches and creative processes, but the rigidity of the system remained a significant obstacle to implementing these methodologies in teaching and learning.

Furthermore, in 2016, the World Economic Forum held its annual meeting, "The Future of Jobs," themed "Mastering the Fourth Industrial Revolution" [37]. In a world shaped by robotics, autonomous transportation, artificial intelligence, machine learning, and biotechnology, the necessary skills are evolving. According to the report, the top ten skills needed in 2020 to prepare for this revolution, in hierarchical order, were complex problem-solving, critical thinking, creativity, people management, coordinating with others, emotional intelligence, judgment and decision-making, service orientation, software use, and flexibility of thought. It's noteworthy that the top three essential skills are cognitive rather than social, while in 2015, the top three were complex problem-solving, coordinating with others, and people management. Thus, creativity ascended from the tenth to the third position in 5 years, and critical thinking from the fourth to the second place [38].

Additionally, the OECD (Organisation for Economic Co-operation and Development) initiated a project on future skills called "The Future of Education and Skills: Education 2030" [39], which aims to address two fundamental questions: "What knowledge, skills, attitudes, and values will today's students need to succeed in life and build the world of tomorrow?" and "How can education systems effectively transmit these knowledge, skills, attitudes, and values?" [39].

Furthermore, the Programme for International Student Assessment (PISA), which has been studying student achievements in OECD member countries since the 2000s in the fields of reading, mathematics, and science, will shift its focus to creative thinking for its 2022 study [40]. According to the OECD, this study should serve to "encourage positive changes in educational policies and practices" by facilitating "new pedagogies that promote creative thinking" and fostering a "broader societal debate on the importance and methods of supporting this crucial skill through education" [40, 41]. According to this Centre, critical thinking and creativity "play an increasingly important role in the job market," but they also contribute "to individual well-being and the proper functioning of democratic societies" [42]. The OECD has developed competence frameworks for creativity and critical thinking, aiming to "establish a common understanding of what creativity means in the classroom and to establish consensus on expectations within the teaching community and between teachers and students" [43] by identifying the skills to be developed in students through education. Additionally, the OECD has created lesson plans based on eight criteria for the development of pedagogical activities aimed at fostering critical thinking and creativity. These criteria include arousing students' need and desire to learn, being

stimulating, providing clear technical knowledge in one or more areas, including the completion of a production, inviting students to co-design part of the production, solution, or problem, addressing problems that can be viewed from different perspectives, allowing room for the unexpected, and giving students the time and space to reflect and provide/receive feedback. The OECD has stated that “teachers and experts from the eleven countries have developed nearly a hundred lesson plans in various disciplines” [44].

In conclusion, less than a decade ago, a shift in the essential skills to be developed for the approaching century seemed evident, as acknowledged by industrialists and the economic world: critical thinking and responsibility, creativity and innovation, and problem-solving. One skill that garners unanimous support in government and industrial discussions is creativity. Evidence of this is the development of the creative economy since the 2000s. However, merely acknowledging these observations and initiatives, which vary in merit depending on the contexts and objectives presented, without questioning them would be unsatisfactory. What are their real objectives? A majority of organizations and companies state that they aim to develop critical thinking, enable students to create the society of tomorrow, and prevent them from going to work “like robots”. Do our current leaders and lawmakers listen to, and should they listen to, these eminent figures? What are their true interests? The implicit curriculum behind these initiatives, or hidden from those who do not wish to see it [45], is clearly the structuring of an educational path aimed at integrating individuals into the world of work, and more broadly, into the world of work according to their political and economic vision: political liberalism and capitalist economics. Thus, over the past 30 years, multinational corporations seeking to influence curricula in terms of knowledge, skills, and personal qualities [46] have emerged, driven not by philanthropic goals but undoubtedly by financial ones. As stated, the common core of knowledge, skills, and culture ultimately represents the educational embodiment of these objectives, with school programs being the end result.

Ultimately, companies aim to develop critical thinking, analytical thinking, creativity, but do they genuinely aim to develop responsibility, well-being, and/or intellectual emancipation if educated individuals could challenge the system (responsible for many ecological and social ills) in which they thrive? The World Health Organization and the OECD have tried to overcome this antagonism, on the one hand through the creation of the notion of psychosocial competence and the promotion of life skills by the World Health Organization, and on the other hand by promoting the development of creativity and responsibility in students by teachers for the OECD.

### 3 The model of bright creativity

#### 3.1 The multifaceted nature of “ethical” creativity: exploring benevolence, morality, and ethical dilemmas

Creativity is inherently non-neutral, suggesting that considerations of intention, reactivity, and passivity are pivotal in evaluating both typical behavior and, particularly, the ethics of creative output and reasoning. Scholars have posited that creativity may occasionally manifest with malevolent characteristics, associated with specific personality traits and behaviors [6, 7, 47]. Conversely, it can also exhibit benevolent traits, suggesting a spectrum that encompasses moral and immoral dimensions. Consequently, creativity may be categorized as malevolent, benevolent, moral, or immoral. Drawing upon these notions and findings from meta-analyses and psychological inquiries, it is logical to propose a model of benevolent and moral creativity, considering broader factors such as respect and social morality alongside creative aptitude.

Illustratively, the autonomous car and the moral machine experiment represent a tangible application, akin to the classic trolley problem, within a creative paradigm applied to emergent technology [48]. While the autonomous car signifies innovation, its decision-making is algorithm-driven. Analogous to the moral dilemma posed in the trolley problem, wherein individuals are tasked with choosing between saving different groups, the autonomous car faces the quandary of prioritizing between various demographic groups in unavoidable accidents. For instance, should it prioritize saving the elderly or the economically disadvantaged?

Moran [49] underscores the potential detrimental consequences of creativity, citing examples such as financial derivatives, pervasive surveillance culture, and medical therapies involving genetic modification. Nonetheless, creativity can also catalyze positive cultural shifts, exemplified by movements like women’s liberation. Moran [50] delineates creativity and ethics as distinct yet interrelated domains, advocating for their convergence to prevent creativity from being perceived as amoral. Proposing expanded solutions to moral dilemmas, such as diverging from conventional ethical frameworks through novel perspectives and anticipatory measures, Moran highlights the necessity of creative ethical



deliberation. Concurrently, Cropley et al. [51] advocate for the cultivation of ‘ethical creativity’ (p. 300) to navigate moral complexities.

Interrogating benevolence and morality offers insights into the ethical evaluation of creative endeavors. For instance, scrutinizing Aaron Swartz’s actions—downloading nearly 5 million documents from JSTOR and facing thirteen charges—poses a dilemma: while individually deemed immoral, his motive to enable wider access to scientific literature could be considered morally commendable and benevolent. Similarly, the assassination of tyrants like King Joffrey in “Game of Thrones” or Julius Caesar by figures like Brutus and the senators exemplifies situations where malevolence towards a single entity is perceived as benevolence towards the masses.

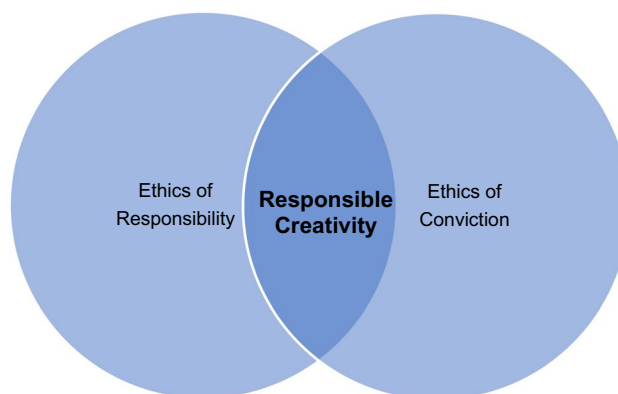
Narvaez and Mrkva [52] assert the relevance of imagination in decision-making, especially in moral quandaries, defining moral imagination as the capacity to generate beneficial ideas aligned with notions of goodness and righteousness, advocating for its integration into daily life to facilitate ethical decision-making. Coeckelbergh [53] conceptualizes moral creativity as a guiding principle influencing social engagement and human moral development, contrasting human moral agency with that of moral machines. Li and Csikszentmihalyi [54] delineate three dimensions of morality—conventional, universal, and professional ethics—observed in scientists and artists, who exhibit creative morality aimed at maximizing benefits and minimizing harm through their work. These discussions extend to human-programmed intelligent decision-making technologies [55], posing legal and ethical dilemmas regarding machine consciousness, programming principles, and complex moral scenarios. Hilton [56] advocates for employing imagination to envision balanced creative outcomes and leveraging social wisdom to provide ethical guidance, emphasizing the importance of contextual understanding. Moreover, instances of “creative deviance” [57] illustrate situations where ostensibly self-centered actions yield broader benefits, challenging conventional norms. Conversely, seemingly altruistic behaviors may reveal underlying egocentric motivations [58], while individuals with creative inclinations may exhibit unethical tendencies, moderated by their moral identity [59]. Exploring unconventional therapeutic practices, such as doctors using substances like cannabis or psilocybin for therapeutic purposes [60, 61], further underscores the complexities of morality within creative contexts.

### 3.2 The responsible creativity model

The concept of responsibility, as defined by the Oxford English Dictionary [62] entails “a duty to look after or care for someone or something, so that it is your fault if something goes wrong”. This definition suggests a direct or indirect association with burdens, commitments, obligations, restraints, and even power. It implies that if something goes awry, accountability lies with the responsible party, while conversely, success can be attributed to them.

The central question at hand is the reconciliation of creativity, often aligned with an ethos of conviction [63, 64], with responsibility (as illustrated in Fig. 1). The ethic of conviction focuses solely on not betraying a value or transgressing a norm (e.g., truth, kindness), demanding absolute purity of means and showing indifference to consequences. What matters is not efficiency or the material triumph of a value, but the respect for it by the person acting and through their intention and action [65]. However, Hegel argued that this ethic’s lack of pragmatism blurs the line between morality and immorality [66]. In contrast, the ethic of responsibility is rational in relation to a goal pursued by the actor, characterized by attention to means from both their practical efficacy and their consequences [67]. This ethic requires constructive critical thinking [67].

**Fig. 1** Responsible creativity in the light of ethics



This juxtaposition suggests that while creativity may align with purely ideological intentions, responsibility necessitates pragmatism, entailing the adaptation of intentions, means and predictions to reality. As noted by Weber [68], ethical pursuits can be subsumed under either responsibility or conviction, yet these notions are not mutually exclusive; rather, they complement one another. This reconciliation is undeniably challenging. Setting predefined goals for creativity risks stifling its potential by imposing constraints, while failing to tether creativity to a framework of care and responsibility in the event of failure could yield detrimental societal outcomes. For instance, in the realm of nuclear energy, a creativity rooted in conviction may advocate for its unrestrained development and application, as evidenced by the creation and utilization of the first nuclear bombs in Japan in 1945. Conversely, responsibility dictates constraints, delineated by intended applications (e.g., energy production for civilian use) and limitations on military applications, alongside a commitment to mitigate risks (e.g., through measures to prevent accidents like those at Chernobyl or Fukushima). Responsible creativity, therefore, seeks to foster innovation (e.g., nuclear fusion) while safeguarding against harm to promote sustainability.

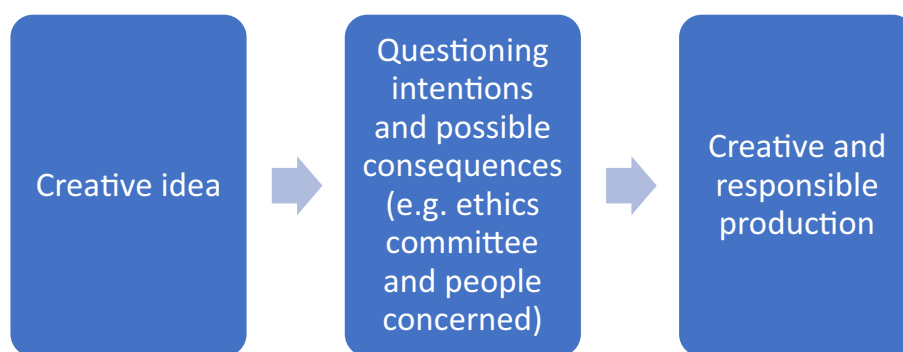
Runco [47] contends that creativity inherently lacks a dark side, arguing that if creative outputs are malevolent, this manifests in their impact rather than being an intrinsic quality or requisite trait of creativity. He likens this notion to labeling hammers as evil due to their potential for destruction, rather than acknowledging their constructive potential. He asserts that the creative process itself is amoral, though divergent thinking may yield ideas with moral or ethical implications. Moreover, he underscores the nuanced distinction between malevolent and benevolent creativity, exemplified by the atomic bombings of Nagasaki and Hiroshima, which, while tragic, ended a war and saved lives, underscoring the significance of intent and decision-making in creativity. Similarly, Hecht [69] reflects on the paradoxical legacy of the atomic bombs, acknowledging their role in ending conflict while highlighting the enduring threat they pose to humanity. Thus, while emblematic of human ingenuity, the atomic bomb underscores the complex interplay between innovation and responsibility, serving as a cautionary tale of the need to weigh the consequences of creative endeavors.

Hence, creativity is not inherently malevolent merely because its original intent was malicious; it may instead sometimes assume a malevolent character through its application towards nefarious ends or by transgressing established norms and values. Instances exist where benevolent aims and intentions yield adverse consequences, with the nature of these outcomes contingent upon contextual factors. A case in point is the actions of Chinese researcher He Jiankui in 2019, who employed the CRISPR-Cas9 genome-editing technique on human embryos as part of in vitro fertilization (IVF) procedures to confer natural resistance to the AIDS virus (HIV) upon twin girls. However, as early as 2015, the international scientific community deemed it irresponsible to utilize CRISPR on embryos. The issue arose when only one embryo exhibited the intended mutations, while the twins acquired unforeseen mutations with potential hereditary implications whose ramifications remain uncertain. Consequently, despite his altruistic motives, He Jiankui received a three-year prison sentence for his failure to exercise restraint in light of known and probable adverse outcomes.

More recently, within the domain of ethics and genetics, the Spectrum 10 K project in the UK, aimed at collecting the genomes of 10,000 individuals with autism, has elicited numerous inquiries and objections. While the initial project obtained approval from Research Ethics Committees, many voices within the autistic community have expressed concerns regarding inadequate information on data protection and the underlying intentions of certain researchers to cure autism. Despite assertions that the project's objectives are not eugenic in nature (such as developing prenatal tests or treatments for autism), apprehensions persist, stemming from historical contexts wherein homosexuality was pathologized and efforts were made to "cure" it—an approach that still persists in certain regions. Consequently, while creativity propels scientific endeavors forward, researchers must acknowledge potential consequences, including the misuse of data for eugenic purposes.

Ultimately, recognizing that human creativity cannot be stifled, given the absence of an inherent framework dictating creative pursuits, and acknowledging that creativity is not invariably benevolent, moral, or sustainable, it becomes imperative to incorporate an ethic of responsibility and introspection (as illustrated in Fig. 2). This imperative arises to avert the perils associated with unrestricted freedom and to strike a viable balance with safeguards, and could easily be implemented in an educational context. The first phase of Fig. 2 concerning the process of responsible creativity from idea to production emphasizes the generation of innovative and creative ideas. Teachers may encourage students to explore unconventional topics to cultivate their creative thinking. Group activities and interdisciplinary projects can be integrated to promote collaboration and diversity of ideas. The second phase involves awareness of intentions behind the creative idea, critical reflection on them and evaluation of the potential positive and negative consequences of the implementation of the idea. Case studies and classroom debates can help students understand various perspectives and make informed decisions. The third phase entails realizing the creative idea while integrating ethical considerations and lessons learned from reflecting on intentions and consequences, through a retrospective analysis. From a teaching

**Fig. 2** Responsible creativity from idea to production



and learning perspective, practical activities and project-based learning can assist students in implementing their ideas responsibly, integrating ethical principles from the outset of the production process. For older students, internships and professional experiences can provide real opportunities to apply their creative skills while considering ethical considerations and feedback. Policymakers could incorporate modules on the ethics of creativity into school curricula, encouraging students to critically reflect on the implications of their ideas.

Lastly, akin to the adage about "science without conscience," would creativity devoid of ethics and responsibility not "precipitate the ruination of the soul"? This notion resonates with the Berlin model of wisdom proposed by Glück [70], wherein individuals are not dictated exact courses of action in challenging scenarios; instead, wisdom entails entertaining multiple perspectives on the issue and suggesting diverse approaches. Glück underscores the importance of examining individual developmental trajectories across the lifespan to comprehend the evolution of wisdom. This can be achieved by encouraging individuals to engage in imaginative problem-solving dialogues, envisioning scenarios detached from personal involvement, and seeking counsel from others when confronted with dilemmas—a pedagogical approach congruent with Sternberg's [71] eight-step model of ethical conduct. Noonan and Gardner [72] propose a three-step process for addressing post-creative developments: identifying threats or opportunities, evaluating response options guided by ethical principles, professional networks, and individual discernment, and subsequently taking action. Such processes are imperative as creative endeavors may encounter unforeseen developments, which can be mitigated through the collective wisdom of peers.

Altogether, we assume that the term "responsibility" encompasses a range of notions including "benevolence" (the quality of being respectful, helpful for the happiness of others, and generous as regard to the corresponding intention), "flexibility" (the quality, character, or fact of being open-minded, and cognitively flexible [67], "positive" (constructive rather than negative critical thinking [73] and attitude of being solution-oriented rather than problem-oriented), "reliability" (the ability to be upheld or defended as valid, correct, or to work competently—[74]), "accountability" (the fact of being answerable for one's decisions or actions and the expectation to explain them when requested), "reflexivity" (the ability to learn from our mistakes, to turn our gaze inwards to become more aware of ourselves and our inner functioning—intentions, motivations, tendencies to act...-, which allows to regulate them more effectively, [67]) and "wisdom". Responsibility is grounded on these qualities, and through a reflective process and introspection promoted by various filters, it enables the consideration of oneself, others, and the environment in both intentions and actions, without imposing predetermined responses [67]; hence it is creative.

#### 4 Fostering psycho-education for responsible creativity in schools

So, schools have a role to play here. Teachers could make students aware of all the problematics illustrated in the Fig. 1 from an early age by integrating these considerations into the processes of teaching and learning. Case studies (strongly encouraging students to question and reflect on the responsible use of technology), practical exercises (allowing students to discuss ethical dilemmas related to current affairs), and the provision of pedagogical resources for teachers would assist educators in deepening their understanding of the subject and finding concrete ways to incorporate it into their courses, and on the other hand, to prompt students to consider different perspectives and make informed decisions. Also, in any creative exercise, teachers might add questions about the values served by the creative production, the ethical nature of its uses and potential misappropriations, and take these answers into account in the grading (training to ethics of responsibility). They can make students keep a reflective diary [67], inviting them to examine and be aware of their



intentions and the values served by the means used in the creative act (training to ethics of conviction). This awareness and the correlative reflexivity that is essential to both conviction and responsibility can be favored by meditation training [67]; and see the part 4.5): teachers can also support this learning process by punctuating it with meditations focused on the corresponding themes ("What are my values? What are my intentions? Do they align with my values? What are the potential or actual consequences of my values and creations on myself, others, and the entire environment? What can I do to improve their ethicality?"). We hypothesize that repetition of these kinds of exercise may create an ethical inclination: the integration of elements on ethical design into artistic, scientific, and engineering programs would encourage students to regulate their intentions ethically and consider the impact of their creations on society and the environment.

Thus, the pursuit of fostering psycho-education for responsible creativity within educational institutions signifies a departure from traditional pedagogical norms. Rooted in the field of research about "education for..." (responsibility [75], citizenship, health, environment etc.), this paradigm shift encompasses both continuity and rupture with conventional educational practices. And there are other educational paradigms (so called "alternative pedagogies") that we won't go into here for lack of space, but which might also be relevant to analyze as regard to responsible creativity. As Barthes et al. [76] assert, "educations à..." represent a formalization distinct from traditional schooling, extending beyond its boundaries within a globalized landscape characterized by economic pressures. Notably, these approaches relegate academic knowledge to a secondary position, emphasizing thematic focus on societal issues, engagement with pertinent values, and the explicit goal of behavioral evolution [76]. These educational paradigms transcend formal schooling, permeating both formal and informal educational settings [76] such as museums [77–79]. However, their integration into formal education systems poses institutional challenges regarding knowledge dynamics, schooling structures, and pedagogical roles [79]. The emergence of "educations for..." marks a divergence from traditional schooling models, facing challenges from corporate-driven competency models and the trend of deschooling education, prompting a critical examination of their compatibility with existing public education systems [80].

These educational initiatives extend across diverse educational contexts, including early childhood education, home-schooling, and various endeavors within schools. They encompass citizenship education, democratic representation and environmental education [80–83]. The imperative for environmental education and sustainable development is underscored by contemporary ecological crises, epitomized by the COVID-19 pandemic, emphasizing the interconnectedness between ecological degradation, biodiversity loss, and intensive farming practices. Furthermore, integrating responsibility and critical thinking into environmental and sustainable education is paramount [84–88], as reflected in national educational frameworks such as that of the French Ministry of Education [89, 90].

Subsequently, we have opted to propose several means for integrating responsible creativity education into formal educational settings initially, followed by the delineation of five practices conducive to fostering creativity and fostering a sense of responsibility: board games, video games, philosophical workshops, wisdom education, and mindfulness meditation.

## 4.1 Board games

The Oxford English Dictionary defines a board game as "any game played on a board, often utilizing dice and small pieces that are maneuvered around" [91]. Board games encompass various types (collaborative, strategic, investigative...) typically devoid of screens and involving a minimum of two participants. While studies exploring the nexus between board games and creativity are not novel [92, 93], contemporary research increasingly examines the creative potential of individuals [94], the interplay among games, empathy, and creativity [95], and the cultivation of problem-solving aptitudes [96]. While social consciousness and responsibility are not typically the primary focus of board games, many are expressly designed to foster these competencies. Notable examples include "Blacks and Whites," akin to Monopoly, which underscores prevalent social disparities between whites and blacks in the United States, intended to stimulate dialogue and awareness regarding these issues [97]. Major corporations like Hasbro also venture into this realm, exemplified by Monopoly Socialism, despite Monopoly's original intent to critique the adverse facets of capitalism [98]. Games are additionally crafted to foster social inclusion, well-being, and agency, as evidenced by "This is Me," utilized with individuals coping with dementia [99]. Moreover, board games are developed for educational objectives, such as environmental education [100] or the World Peace Game, a "hands-on political simulation" enabling players to explore global interconnectedness through economic, social, and environmental crises, as well as the specter of warfare [101]. In assuming roles like Prime Minister, children in this game invariably evince a robust sense of responsibility for their nations [102, p. 182], echoing John Hunter's assertion that in leadership roles, accountability for one's actions is imperative [p.

205]. The objective is to broker peace among disparate nations, with victory contingent upon universal enrichment, a complexity fostering creativity and innovative solutions [p. 89].

More concretely, board games are utilized within education. Kordaki and Gousiou [103] shed light on the utilization of digital card games in education, offering insights into innovation within teaching methodologies, demonstrating how games can serve as effective tools in promoting interactive learning and skill development among students. Bochennek et al. [104] propose a novel perspective on the utilization of card and board games within medical education. Their study illuminates how these games can provide experiential learning opportunities, fostering a deeper understanding of medical concepts while enhancing clinical skills. Additionally, Noda et al. [105] emphasize the efficacy of board games in enhancing knowledge comprehension and fostering interpersonal interactions. By fostering a collaborative and playful environment, these games bolster participant motivation and promote learning through play. Nakao [106] and Gauthier et al. [107] explore the impact of board games on health and medicine. Their research demonstrates how these games can be proactively utilized to promote mental well-being, encourage healthy lifestyles, and enhance health knowledge, thus underscoring the potential of games as tools for health promotion. Furthermore, Smith and Golding [108] and Kordaki & Gousiou [103] highlight the potential of board games for skill development and critical thinking. Whether in the context of higher education or digital education, these games offer unique opportunities to stimulate student engagement and promote innovative learning approaches. Moreover, Teixeira et al. [109] and Robinson et al. [110] examine the utilization of board games in specific contexts such as biology and geography education. They highlight how these games can be adapted to reinforce understanding of complex concepts and encourage creative exploration across various disciplinary domains. Additionally, Gashaj et al. [111] provide valuable insights into the link between board games and executive function development in children. Their findings suggest that board games can play a crucial role in cognitive stimulation for young children, thus emphasizing the importance of playful activities in education. Ultimately, board games offer a versatile platform for promoting responsible creativity across diverse educational and professional contexts, even if this field of investigation remains to be explored. By leveraging insights from empirical research, educators and practitioners can fully harness the potential of games to encourage ethical innovation and cognitive development, thereby contributing to shaping a more creative and responsible future.

Beyond board games, video games represent another potent avenue for nurturing creativity and responsibility.

## 4.2 Video games

The Oxford English Dictionary [112] defines a video game as “a game in which players manipulate images on a screen by pressing buttons”. Video games encompass various forms, including those playable through physical movement without direct tactile interaction, as exemplified by VR headsets, the Wii, and Kinect. Numerous studies and publications have explored the impact of video games on creativity [113–118], highlighting their role in enhancing perceptual, attentional, and cognitive skills [119]. A study conducted by Oxford University with a sample of 40,000 individuals found no adverse effects on mental health [120], while an earlier study suggested their potential contribution to positive mental well-being [121].

Moreover, a survey spanning China, Japan, the US, and the UK revealed that “66% of gamers are inclined towards socially responsible gaming,” with only 9% expressing reservations towards games promoting environmental sustainability [122]. Although social awareness and responsibility may not always be the primary focus of video games, they are frequently integrated into game design to cultivate such skills. Certain titles excel in fostering environmental consciousness, such as *Eco* [123], with UNESCO asserting that “well-designed video games can democratize learning, making it dynamic, learner-centered, and enjoyable, while empowering players to envision themselves as responsible global citizens” [124].

The integration of sustainability education through video games extends from primary school [97] to high school levels [125] and has potential applications in diverse contexts, including tourism [126]. However, psycho-educational endeavors for fostering responsible creativity are not limited to sustainability; broader social awareness is also of interest. For instance, the Japanese video game *Kuukiyomi*, derived from “*kuuki yomenai*” (“not being able to read the atmosphere”) [127], serves to elucidate Japanese customs and etiquette for individuals unfamiliar with them, such as foreigners, given the significance of social norms and harmony in Japanese culture. Nevertheless, this game holds relevance beyond Japanese society, as it can aid in cultivating social awareness and understanding of social norms and etiquette in various Western cultures. Simulation games like *Civilization* or *Age of Empires* require players to exercise creativity in conflict resolution while also emphasizing responsibility. Opting for aggressive tactics

over diplomatic relations or mismanagement of resources in a finite world can lead to detrimental consequences, underscoring the importance of strategic decision-making and responsible behavior within the gaming context.

The integration of video games into fields such as education, health, and well-being has garnered increasing interest due to their potential to foster responsible creativity and positive learning. Papastergiou [128] highlights that electronic games can play a crucial role in health education and physical education, not only enhancing youths' knowledge and skills in health but also motivating them to adopt responsible behaviors for their well-being. Granic et al. [129] underscore the manifold cognitive, motivational, emotional, and social benefits of video games, thus emphasizing their capacity to promote the development of social and emotional skills crucial for responsible creativity. Similarly, Merino-Campos and Fernández [130] highlight the effectiveness of active video games as educational tools for health and physical education, emphasizing the importance of innovation in promoting this responsible approach in these domains. Studies examining the impact of video games on academic achievement, such as that by Young et al. [131], stress the need to design educational games that foster problem-solving and creativity in school contexts. However, Whitton and Maclure [132] shed light on the persistent biases against video games despite their educational potential, thus highlighting the challenges in promoting responsible use of these tools in education. Likewise, Hsiao's [133] study on academic debates about digital games and learning highlights efforts to integrate game principles into educational contexts to promote responsible creativity among learners. Cannon-Bowers et al. [134] and Egenfeldt-Nielsen [135] broaden the perspective by examining the use of video games in healthcare and educational settings, respectively. Both studies underscore the importance of designing games that encourage what we call responsible creativity, whether in the context of healthcare professional training, therapy, or academic learning. Finally, Martinez et al. [136] provide a systematic review of studies on the use of entertainment video games in academic learning, highlighting their potential effectiveness in various academic domains and their ability to encourage a responsible approach to learning. Collectively, these studies illuminate the potential effective role of video games, not only to teach knowledge content but also to catalyze responsible creativity in various domains, from health to education.

### 4.3 Philosophy workshops

The Oxford English Dictionary [136] defines philosophy as "the inquiry into the nature and significance of existence and human life". While numerous inquiries explored the impact of philosophy education on creativity [137–144], this remains a relatively nascent field of study and widespread implementation of philosophy education in schools has yet to be achieved globally. So further research is warranted to explore its effects. This is notably underscored by the objectives of the UNESCO Chair on "Philosophical practices with children: an educational foundation for intercultural dialogue and societal transformation," which endeavors to "cultivate critical thinking skills, humanistic values, gender equality, the imperative of peaceful and respectful intercultural dialogue, and the combatting of all forms of dogmatism from the earliest stages of citizen education" [145].

The integration of philosophy education, particularly through programs like "Philosophy for Children" (P4C), has demonstrated significant potential in fostering skills linked to responsible creativity among students across various educational levels. Trickey and Topping [146] conducted a systematic review of controlled outcome studies on P4C, revealing consistent positive effects on students' reasoning, cognitive abilities, and self-esteem. Similarly, Ab Wahab et al. [147] conducted a systematic literature review to explore the impact of P4C beyond cognitive skills, identifying themes such as higher-order thinking skills, creating safe environments, fostering civilized discourse, and cultivating a culture of critical thinking in classrooms. These findings underscore the transformative potential of philosophy education in nurturing responsible creativity by providing students with the tools to engage in reflective and reasoned dialogue. Furthermore, the urgency of introducing philosophy education at an early age, as advocated by Damar [148], Polat and Akay [149], becomes apparent. Prasetya emphasizes the necessity of instilling critical thinking skills in children from a young age to cultivate wiser adults in the future, while Polat and Akay underscore the importance of philosophy education in preschool years for stimulating brain development. By introducing philosophy education early, children are exposed to foundational principles of critical thinking and reasoning, laying the groundwork for responsible creativity later in life. These studies collectively highlight the value of incorporating philosophy education into formal and informal educational settings to promote responsible creativity. By offering students opportunities to engage in philosophical inquiry and discourse, educators can empower them to think critically, reflectively, and ethically, thus fostering a culture of responsible creativity that extends beyond the classroom and into society at large.

#### 4.4 Wisdom education

Wisdom can be defined as “the power to judge correctly and to follow the soundest course of action, based on knowledge, experience, understanding, etc.” [150]. Furthermore, it is “the result of applying successful intelligence and creativity to the common good, through a balance of short- and long-term intrapersonal, interpersonal, and extrapersonal interests” [151]. Sternberg argues that strong intelligence and creativity are necessary, but not sufficient, conditions for wisdom, to which one should add tacit knowledge [152]. Also, individual and developmental differences can affect levels of wisdom (individuals’ goals, interactions with the environment, interests, knowledge, values...) [152]. Ultimately, wisdom is a way of thinking and doing things [151] and can be studied through several approaches: philosophical (contemplative life in search of truth, political and legal practical wisdom, scientific understanding of phenomena), theoretical-implicit (seeking to understand people’s popular conceptions of what wisdom is by respecting beliefs), theoretical-explicit (formal theorising of the concept of wisdom as in [153]) [150]. Baltes and Smith [153] point out that high levels of wisdom-related knowledge (such as how to deal effectively with the uncertainty inherent in all aspects of life) are rare and that there are few differences between age groups in the average levels of wisdom achieved in adulthood. Thus, in their view, achieving higher levels of wisdom requires a complex coalition of enhancing factors from various domains (psychological, social, occupational, historical) and simply getting older and reaching old age is not a sufficient condition for being wise. Furthermore, Bates and Smith note that in adulthood, intelligence is not the strongest predictor of wisdom-related knowledge, but rather a combination of psychosocial characteristics and life history factors, including openness to experience, generosity, cognitive style, contact with excellent mentors, and some exposure to structured and critical life experiences [143]. Ultimately, they also point out that assessing wisdom in the laboratory is difficult, but can be done with care and creativity even though some of the elements of wisdom are elusive and complex. Finally, they suggest that future research should broaden the range of tasks and behaviors examined and link psychological approaches to wisdom to interdisciplinary efforts to understand the biopsychosocial dynamics that orchestrate optimal human development and promote vitality in old age.

Sternberg [154] reminds us that wisdom consists of the application of intelligence and creativity to the achievement of the common good, and as a “means to create a better and more harmonious world” [155, p. 325]. Indeed, according to him, wisdom “is not only about maximizing one’s own or someone else’s interest, but also about balancing various personal interests with the interests of others and other aspects of the context in which one lives” [155, 156]. He suggests reading classic works of literature and philosophy to learn and reflect on the wisdom of the wise and to discuss how they can be applied to one’s own life and the lives of others and/or to write essays or do projects related to these works. In the process, he encourages the study of values, without imposing them and by encouraging students to “develop their own values in a reflective way” [155, 156] stresses the importance of including wisdom in the curriculum (it allows for the integration of thoughtful and deliberate values into important judgments, it is a means to create a better and more harmonious world, interest for children to learn to judge correctly as they will serve the community or face challenges and conflicts as adults) even though this may raise several issues (many people will not see the point of teaching something that does not promise to improve outcomes, and wisdom is much more difficult to develop than the kind of achievement that can be developed and easily tested through multiple choice questionnaires). Nevertheless, wisdom is the educative objective of spiritual traditions such as Buddhism, in which numerous tools such as meditation have been developed to foster this quality [157].

#### 4.5 Mindfulness meditation

Kabat-Zinn [158] defines mindfulness as “the awareness that emerges from paying attention intentionally, in the present moment, and without judgment to the unfolding of experience moment by moment” [158, p. 145], and meditation can be “considered a form of mind training that develops attention and alertness, among other things, but also qualities such as calmness, compassion, kindness, and discernment” [159, p. 46, author’s translation]. Mindfulness meditations train several executive functions and improve attention test scores [160, 161], working memory [162], and cognitive control [163].

Mindfulness meditation also develops socio-emotional abilities [164], creativity [165–170], prosocial emotions [171], and prosocial behaviors [172, 173], but this is not necessarily automatic, hence the importance of including

ethical instructions during mindfulness meditation [173–175]. UNESCO and Life University have collaborated to work on and offer a Masterclass on Ethical Mindfulness in 2021, which aims to enable the mastery of a skill of aligning thoughts and actions with core values. This is also the objective of the Meditation-Based Ethics of Responsibility (MBER) educational program, which aims to change people's attitudes and behaviors based on the identification of one's own ethical values and then act in accordance with them [177]. This program contains mindfulness and other secular meditations and exercises and has been shown to enhance creativity and sense of responsibility [178]. Meditation can also be used in schools to cultivate ethical intentions [175]. Although explicitly ethical applications of mindfulness are in their infancy in secular contexts, they are promising [176, 177]. Integrating mindfulness practices into educational settings has also shown promise in fostering socioemotional competencies and creativity among students. Meiklejohn et al. [179] present evidence indicating that mindfulness training in K-12 education can enhance attentional and emotional self-regulation, benefiting both teachers and students. Similarly, Gómez-Olmedo et al. [180] suggest that mindfulness practices contribute to the development of socioemotional competencies crucial for sustainable development, such as emotional regulation, empathy, and resilience. Furthermore, Gueldner and Feuerborn [181] advocate for the incorporation of mindfulness-based practices into social and emotional learning curricula, emphasizing its potential to complement existing programs and enhance resilience among students. Building upon these insights, Henriksen et al. [182] highlight the positive relationship between mindfulness and creativity, noting that purposeful inclusion of mindfulness in educational settings can support student learning, creativity, and wellbeing.

By intertwining mindfulness training with educational practices, schools can cultivate responsible creativity by nurturing essential skills, qualities and habits of mind and general functioning, ultimately fostering resilience and promoting sustainable development among students.

## 5 Recommendations

The model of responsible creativity suggests that creativity can mitigate the adverse effects of neoliberalism and capitalism on various fronts, including the economy (e.g., social inequalities, erosion of solidarity), ecology (e.g., biodiversity loss, resource depletion), and education (e.g., compulsory mass education, illusion of meritocracy). Furthermore, it urges researchers, educators, and the public to envision a new social, political, and educational utopia by breaking free from past constraints [183, 184] and collectively imagining alternative futures [185].

### 5.1 Integrating responsibility, creativity and sustainability in education

Identifying optimal educational approaches to enhance creative productivity by integrating elements of reflexivity concerning individual and collective responsibilities can empower future generations to contribute ethically to society. A more nurturing and personalized education that fosters non-academic skills alongside conventional practices can instill greater responsibility and well-being in society at large. Researchers have already begun examining the impact of benevolence on well-being [186, 187], and the intrinsic link between creativity and sustainability [187–194]. Could positive [195] and sustainable creativity be the natural outcome of sustainable development, i.e., creativity that innovates to meet present needs without compromising the ability of future generations to innovate for their own needs? While education for sustainable development [195–201] and education for creativity [201–205] exist independently, perhaps it is time to integrate and amalgamate them within educational settings?

### 5.2 Implementing innovative approaches for responsible creativity

Additionally, we propose and encourage educators and researchers to design experiments aimed at fostering responsibility and creativity in educational and corporate settings through mediums such as video and board games, mindfulness meditation [206], philosophical workshops, and wisdom teachings [151]. Rather than adding additional hours to the curriculum, these activities could replace some existing teaching methodologies, utilizing video and board games to explore history and philosophical workshops and wisdom teachings to contemplate various historical conflicts. By tailoring interventions to individuals' knowledge, motivations, and environments [205] to encourage introspection regarding oneself, others, and the environment in one's intentions and actions [206], and by integrating responsibility (encompassing benevolence, morality, accountability, sustainability, and positivity) into creativity in a playful manner, we can



illuminate the brighter facets of creativity. This could be done, for example, through education using attentional states of consciousness [169].

### 5.3 Empowering educators as agents of responsible creativity

Central to the realization of fostering responsible creativity within educational settings is the critical role of teachers. As facilitators of learning, educators play a pivotal role in shaping the educational experiences of students. However, traditional teacher education programs often focus predominantly on content knowledge and pedagogical strategies, neglecting the cultivation of skills necessary for fostering responsible creativity. It is imperative to integrate training modules within teacher training programs that emphasize the principles of responsible creativity. These modules should equip teachers with the knowledge and tools to foster creativity while instilling a sense of responsibility and ethical conduct among students. Teacher education could encompass several key areas to effectively foster responsible creativity. Educators might understand the concept of responsible creativity and its broader societal implications, including its role in addressing contemporary challenges across socio-economic, environmental, and ethical dimensions. Additionally, teachers could be trained in innovative pedagogical approaches such as project-based learning and interdisciplinary teaching to promote creativity and critical thinking among students. Integrating values education into teaching practices might be crucial for cultivating ethical behavior and social responsibility, requiring educators to instill virtues like empathy, compassion, integrity, and environmental stewardship through classroom activities and discussions. Furthermore, encouraging mindfulness and reflective practices among teachers shall enhance their own creativity and emotional intelligence, which can serve as a model for students. Lastly, ongoing professional development opportunities could be provided to ensure educators remain updated and skilled in fostering responsible creativity within the classroom. By prioritizing teacher education in this manner, educational institutions can equip educators with the necessary skills and knowledge to nurture a generation of creative and socially responsible citizens.

## 6 Conclusion

Creativity is a dynamic process [9], but its outcome is rarely neutral; it can be deleterious because of malevolent intentions or unintended harm to others during creative endeavors or outputs, or responsible, based on ethical conviction and responsibility.

We introduce and delineate the concept of responsible creativity as the capacity to produce original content (ideas, behaviors, objects, etc.) relevant to one's context while considering the potential moral and legal ramifications of one's intentions and actions in the present and future, aiming to minimize harm (and/or promote good).

This framework aids in promoting mental health by mitigating depressive symptoms associated with malevolent creativity [207], favor sustainable development and could counter the amoral or immoral perspective of dark creativity effects [206]. In a nutshell, responsible creativity embodies a sense of benevolence, flexibility, positivity, reliability, accountability, reflexivity and wisdom in creative intentions and actions across domains such as education, economy, and ecology, with the goal of addressing present challenges and fostering better prospects for the future.

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## Declarations

**Competing interests** The authors declare no competing interests.

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