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Article

Museums as Catalysts for Creativity in Adolescence

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Abstract

To adequately educate citizens on issues such as heritage and heritage education, creativity must be fostered starting in secondary education. This paper analyzes activities like museum visits to determine their modalities and scope, examining the opportunities they provide for encouraging creativity among adolescent visitors. We begin with a narrative bibliographic review based on international database searches, selecting and analyzing the relevant articles. Key findings include various ways the relationship between creativity and museums manifests: as an end goal, as a means to promote specific learning in adolescents, the most common forms of creative expression, the contexts for such expression, and the different options for evaluating existing proposals. *Discussion.* We explore how to clarify and structure the role of creativity in museums aimed at adolescents. Among the conclusions, we emphasize the need for in-depth investigation of this phenomenon, which can enhance creativity training among secondary school students and other personal development variables through museums.

Keywords: heritage; creativity; museums; heritage education; teacher training

1. Introduction

The relationship between museums and creativity remains a current issue that warrants revisiting. Traditionally, museums have been conceived, from a pedagogy of things [1], as spaces where one can find the creative products of others. But today, many museums go further and in addition to storing, classifying collections, and proposing unidirectional reflections, seek to understand and expand their role as environments for creativity [2]. We can say that today there is a consensus in recognizing museums as educational institutions [3] where civil society and the cultural sector can act as key catalysts for creativity to foster change. This work is part of the pedagogical efforts to understand museums as educational spaces and environments where creativity can be encountered in its different forms.

Understanding a museum as a space for creativity [4] means actively engaging in the change processes of its visitors. We focus our analysis on the evolutionary period of adolescence, a key moment in the development of any individual's creativity [5]. Some museums use creativity to promote learning and change in their visitors [3], while others directly aim to promote creative thinking in those who accept the invitation to interact with their proposals [6]. Fostering creativity in museums is not simply a matter of assessing whether their proposals are efficient, easy to use, or responsive to the individual needs of visitors [7]. With this in mind, the objective of this work is to review the existing literature on the relationship between museums and creativity, focusing the analysis on the adolescent public, and on how museums address the role of creativity in their spaces. We aim to review how museums conceptualize the *construct* of creativity, what forms of museum-creativity relationship exist today in museums, how museums evaluate their proposals, and the effects they produce.

Why focus on adolescence? Adolescence is a stage of key changes in the development of creativity. Major physical, cognitive, and emotional changes provide opportunities for such development. These changes represent both opportunities and challenges for creative progress,

which can also become risks, depending on how new capacities are managed and the decisions adolescents make. It is precisely in this management of creative opportunities where educational guidance is essential. In their creative development, adolescents need appropriate role models and experiences to build their creative identity [8], learn to motivate themselves, acquire knowledge, assess risks, dare to play with their imagination, apply appropriate criteria to assess ideas, and express their differences. The educational possibilities of museums depend on their ability to create and maintain positive emotional bonds with adolescents. Santacana et al. [9] conducted a study to examine the perception of young people aged 14 to 16 years towards museums and heritage sites. Along the same lines, Martínez [10] conducted a similar study, extending the age range of adolescents and young people to twenty-five years old. The results of both studies point in the same direction: the low attractiveness of museums for young people and the widespread feeling among them that these institutions are not conceived or designed for them, feeling that they are far removed from their interests and concerns. To promote creativity or any characteristic that, from an educational point of view, is considered relevant for adolescent development, it is essential to overcome this obstacle and ensure that museum spaces are attractive, include stimuli and information that young people consider significant for their lives, and that scheduled visits from schools are a "pleasant surprise", capable of generating cognitive and affective changes.

But what is creativity? From a psychological perspective, the standard definition assumes that creative ideas are both original and useful in a given context [11,12]. Creativity is the psychological process that allows us to come up with these types of ideas, a complex and multifaceted phenomenon that allows us to solve problems in all areas of human activity, including the artistic world. Although cognitive components are fundamental in this psychological process, affective and personal components (such as attitudes, motivation, personality traits, emotional awareness and management) are also relevant [13–15].

Fostering creativity among school students has become a priority for the educational community. The pressure exerted by the changes we are experiencing in every way affects the effectiveness of an educational system deeply rooted in traditional practices. Various studies and curricular applications are attempting to adapt school practices to the new rhythms and needs presented by a more technologically advanced and competitive society, as well as a student body who is much more inclined to participate and interact [16]. Both in Spain and in the rest of Europe, structural educational reforms are being promoted, in line with the challenges posed by the global Agenda 2030 strategy. At the same time, there is a considerable increase in interest in heritage education, directly linked to the action of museums and heritage environments [17]. To address these challenges, criteria and actions are being established aimed at improving teacher training and addressing the changing needs of students. The goal is to achieve an inclusive, equitable, innovative, and high-quality education that fosters increased creative thinking among school students [18]. This work focuses on secondary school students. It also considers that the use of heritage education, especially museum education, can achieve positive results if both teachers and students utilize these resources, taking into account their ability to generate creative discourses based on the information conveyed and the experiences developed through museum visits.

There is a significant tradition in the study of the educational potential of museum visits, stemming both from the interest of heritage institutions themselves and from researchers in schools and universities. There has also been significant work in the field of heritage education, which directly affects the specific scope of museums [19]. The educational role of museums is defined by the description provided by ICOM (International Council of Museums). This is evident in the educational activities that have been implemented in museums since the late 20th century, leading to the educational shift in museums analyzed by Rogoff [20]. The educational potential of museums is rooted in the various developments in pedagogical practices within these institutions, as well as the emergence of educational mediation as a continuous source of innovative proposals, resulting in a stronger connection between museums and society.

However, when discussing museum education, it is common to find studies that focus on the methodologies used to enhance the effectiveness of learning processes [21]. These studies often examine whether museums can support learning by motivating or reinforcing curricular content. However, the promotion of creativity among students participating in museum visits is not often explicitly addressed. While their role as audiences is highlighted, the potential benefits of generating experiences that could enhance creativity are not clearly defined. It is common to find inquiries about the satisfaction of visiting groups [22] or studies related to the acquisition of knowledge about artworks, artists, and artistic expressions, particularly in research focused on visits to art museums. When researching constructs such as creativity or creative processes, the number of articles decreases considerably. This reflects the separation between interest in creativity and its connection to the formal education system. Although related, these concepts have their own nuances, highlighting a specific characteristic that defines them. Therefore, it is essential to avoid confusion in terminology and concepts to prevent erratic analyses. Given the evident educational activity in museums, the DECHADOS project proposes a study of the processes that foster student creativity [23], focusing on the timing of visits made by school groups. With this goal, this inquiry explores how the promotion of creativity in museum activities has been studied.

The study described below aims to provide a detailed view of how museums are addressing the challenge of developing the creative thinking and look of their adolescent visitors, comparing it with other areas of creativity that are not equivalent. Within the educational mission of museums and using these objectives as a reference, this paper presents a literature review of the role that creativity plays in museums today, focusing on adolescents.

2. Materials and Methods

A systematic bibliographic review was conducted based on the PRISMA Declaration [24]. This review focuses on the relationship between museums and creativity, as well as educational proposals for adolescents. The documentary review was carried out in several phases: a) Identification of information sources and selection of relevant documents; b) Bibliographic search for articles in scientific journals using various databases (Scopus, Web of Science, Education Database, Journal Citation Report, Social Sciences Citation Index, Dialnet) and search engines like PROQUEST. The following keyword combinations were used in both Spanish and English: museum, education, creativity, adolescence, school, heritage education, heritage. Different combinations of these terms were applied to the collected articles. c) Selection of relevant studies aligned with the purpose of the work. The inclusion criteria were publication year (from 2014 to the present), language (English or Spanish), and a focus on the roles of creativity in museums for adolescents. The exclusion criteria included studies focused on children or adults and publications which were not peer-reviewed. d) Analysis of the collected information. For this, the content analysis technique was employed to identify theoretical elements and develop interpretations about the study subject, aiming to generate results.

In the first stage, the titles and abstracts were analyzed, applying thematic suitability criteria. After this initial screening, we proceeded to a complete reading of the articles, analyzing the content and identifying their relevance to the study. In the next phase, we searched the bibliographic references of the included articles, specifically examining those that provided the greatest theoretical value. Finally, the results of the bibliographic analysis were compiled, which led to the interpretations, discussion, and conclusions of the study, as presented in the following sections.

Generative artificial intelligence (GenAI) has not used in this paper.

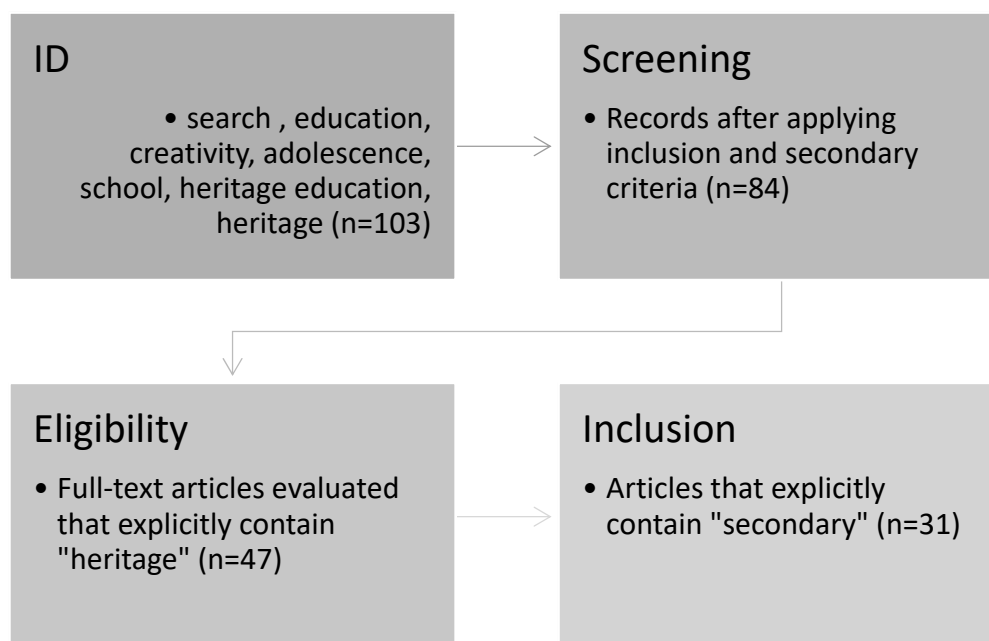


Figure 1. Search flowchart.

Table 1 (annexed in Appendix A). Basic information extracted from the review of publications on creativity in museums 2014-2025.

3. Results. Empirical study. Creativity in Museums and Their Proposals Aimed at Adolescents

This section analyzes the identified works in light of the role that creativity plays in the proposals that museums implement when working with young adolescents. The review resulted in five relevant categories or subsections: creativity as an objective, creativity as a means or resource to achieve other educational goals, the different modalities in which creative action takes shape, the areas in which this action is projected, and, finally, the ways in which museum institutions evaluate their proposals.

3.1. The Creative Development of Adolescent Visitors as a Goal

Museums are rethinking their role within the community, moving away from the traditional focus on art exhibition and appreciation, to assert themselves as agents of social change through the promotion of creative thinking. Creativity is an essential skill for addressing contemporary challenges, and museums, as spaces for informal learning, are strategically positioning themselves to cultivate it, especially in young people [25].

In recent years, many museums have transformed their educational proposals to adapt them to the needs of their adolescent visitors, including the promotion of creative thinking. To this end, they have configured parts of their spaces as creativity laboratories, providing opportunities for critical dialogue, collaboration, and group co-creation, recognizing visitors as active stakeholders.

Proposals that seek to develop creative thinking in adolescents share certain common characteristics: they aim to promote changes in the way adolescents understand creativity, and also in the way they relate to their own creative potential. This is only possible if museums also modify the way they interact with visitors, with participatory and collaborative proposals, located at a crossroads with languages and disciplines, in which the relationship is capable of connecting with young people's real interests and is no longer unilateral. Each of these characteristics is analyzed below.

Initially, it is important for young people to understand creativity from a rigorous perspective, free from the prejudices that often accompany it socially. Museum proposals seek to facilitate a

realistic conceptualization of creativity, distancing it from a mythical and/or exclusive view of the artistic sphere. It promotes its understanding as a psychological process which can be applied to multiple areas of human life, closely linked to effort, deliberate practice, and dedication. An illustrative example is the Columbus Museum of Art (CMA), which a couple of decades ago chose to adopt creativity as the central axis of its educational and social mission and created the Center for Creativity, utilizing a pedagogy centered on imagination, inquiry, and play [25].

Along with this conceptual demystification, the aim is to connect adolescents with their own creativity. This ceases to be a distant characteristic reserved for extravagant geniuses, but rather a personal resource for individuals like them (the adolescent visitor) who make combined use of their divergent (imagination, ideation, etc.) and convergent (analysis, selection, etc.) skills for creative purposes. In essence, creativity becomes a way to promote autonomous thinking, experimentation, and personal expression. Along these lines, Dysthe [21] proposed the promotion of creative thinking in art museums through dialogic pedagogy, exploiting the possibilities offered by difference and disagreement. In the author's experiences in various museums in Denmark (e.g., Arken Museum of Modern Art, National Gallery – SMK-, Design Museum), adolescent visitors begin to understand that a work of art can be observed in many ways and has different meanings for different people. This is achieved by starting with an initial connection with one's own creativity as a basis for meaningful and critical engagement with the exhibitions. The author suggests that dialogic education in museums can contribute to the expansion of the functions of education: qualification, socialization, and subjectivization.

In fact, museums are increasingly aware of the importance of not only cognitive but also affective-personal factors in creativity. Young people's attitudes toward their own creativity, their self-perceived creativity, are key [26]. Recommendations or persuasive speeches are not enough to generate significant attitudinal change but should rather be fostered through transformative experiences.

To encourage students to consider and connect with their own creativity, museums have had to change the way they relate to visitors, abandoning the previous unidirectionality and authoritarianism, conceptualizing visitors as co-producers of knowledge. For example, through a Youth Participatory Action Research (YPAR) methodology, Crabbe et al. [27] encouraged adolescents and educators to take part in participant observation groups, interviews, and focus groups, allowing young people to become researchers and agents of change, not just subjects of study. Other examples can be found at the Reina Sofía Museum in Madrid. The "#Cápsula2050" project proposes a collaborative approach with the aim of rethinking the role of the museum, generating alternative discourses to the official ones, and reformulating modes of institutional representation [28]. At the same museum, the project "I Believe in Art" proposes a critical reflection on the mechanisms of cultural legitimation. Starting with questions such as "Who decides what is exhibited?" or "What does it mean to be an artist?", young people question the museum's status as a space of symbolic authority, raising the possibility of reconfiguring the rules of contemporary art from youth perspectives [28].

The most successful experiences with young people tend to offer participatory and collaborative approaches, encouraging engagement through collective creation, content design, and critical reflection and analysis. Generally speaking, this educational approach avoids the idea of a vertical and unilateral transmission of knowledge and encourages horizontal processes of learning and cultural production. For example, the Prado Museum's "Detonators" project proposes collective creation laboratories in collaboration with Madrid City Council's youth centers, based on adolescents' areas of interest and promoting temporary exhibitions by participants. At the same museum, the "Music in Your Eyes" workshop encourages adolescents to compose electronic music pieces inspired by 19th-century paintings, integrating digital media and diverse artistic languages [29]. This is another common characteristic of museum proposals that attempt to connect with adolescents and their creativity: the intersection of disciplines and languages, facilitating a richer, more varied, and intense educational and personal experience (e.g., visual art, technology, theater, music), as well as equally varied and updated expressive languages (e.g., performance, virtual reality, urban art). This

interdisciplinarity and fusion of languages and media is especially relevant for breaking down adolescent myths about museums, as places that are rigid, boring, and lacking in interest. Or, in other words, strengthening young people's emotional connection to artistic and institutional heritage based on their own interests.

Other examples of multidisciplinary proposals that connect with the interests of adolescents and encourage their creativity can be found in projects such as "Journey to the Beginnings" by the Romanian Institute of Archaeology [30]. This project seeks to reimagine and reinterpret the prehistoric past of the Danube Valley through an immersive art practice, with theatrical installations, performance rituals and artistic artifacts inspired by Neolithic finds and escape room challenges. *Afundación* in A Coruña, Spain, also has installations such as "Habitats: Extended Nature", which encourages young people to reflect on the environment through immersive tools and virtual reality. These sensory approaches are based on new technologies and allow for the creation of new narratives around the relationship between the environment and human beings, stimulating imagination and environmental awareness.

Another example can be found through Yu [31], who developed an experimental project at the National Museum of Fine Arts in Taiwan, where she integrates aesthetic education, politics, culture, history, and the environment. The author argues that developing aesthetic perception can transform the way students relate to art, fostering their creativity, critical thinking, and cultural sensitivity. The study concludes that art education should be an open, interdisciplinary, and experiential process that prepares students to interpret and transform the world from a critical aesthetic perspective, vindicating the advantages of museum spaces.

To materialize the relationship between museums and young people, it is essential to connect with their interests. The informal spaces offered by museums are "free-choice" learning environments, where young people shape their own experiences and decide how much and how deeply they want to engage [32]. Based on their research in Natural History museums, Cesario & Nisi [33] found that young people's main preferences when visiting and making decisions in museum spaces focus on digital interaction, gamified narratives, personalized tours, and the chance to share their experiences on social media.

Together, these experiences point to a vision of museums as spaces for social, cultural, and pedagogical experimentation, in tune with current social transformations and with a clear commitment to engaging new generations in the construction of cultural knowledge through creative thinking.

3.2. Creativity as a Means for Adolescent Development

The presence of creativity in museum spaces is complex and multifaceted. Some of the reviewed proposals demonstrate the intentions that lead to the use of creativity as a means to achieve student learning and development. They use creative resources to promote other aspects and dimensions of development: empathy, personal well-being, moral judgment, communication skills, collaboration, and a sense of community.

Long et al. [34] consider that creative resources allow for the generation of attitudes and a real benefit at a physical, intellectual, social and emotional level. Noble [35] expresses the same opinion when, after an immersive experience in the museum and using online resources, he concludes that creativity helps young visitors to be more curious, observant and to ask effective and challenging questions.

For Echarri [36], the collaborative Guernica project at the Museum of the University of Navarra has provided an opportunity to reflect on violence, coexistence, and social awareness, stimulating empathy and a sense of justice in adolescents. Through a universal symbol of peace such as Picasso's Guernica, values such as pacifism are explored and a sense of community is promoted by integrating diverse young people into the creation of a collective mural.

Promoting empathy, in this case ethnocultural, is also Duffey's [37] goal through the reflective use of photography on visits to historical sites related to traumatic experiences (e.g., September 11

Museum and Memorial in New York, Holocaust Museums and related memorials). Students select a significant location linked to a community other than their own, take photographs of the site, write a reflection on their experience, and present their images and learnings to the group. This methodology aims to develop critical awareness, cultural sensitivity, and multicultural competence through a reflective and transformative learning process.

In recent years, the Carnegie Museum of Art in Pittsburgh has developed a series of innovative programs aimed at adolescent audiences, which integrate creative resources, active participation, and the development of personal and professional skills [38]. These programs seek to empower young people as cultural agents, capable of communicating, creating, and leading from their own perspectives. Beyond creativity itself, the objectives of the Carnegie Youth Program focus on strengthening communication, leadership, and collaborative work skills, creating a sense of belonging and cultural inclusion, and developing personal confidence in adolescents. To this end, they utilize collaborative art workshops, dialogue sessions, film series, debates and talks with artists, as well as projects curated by the young people themselves. Along the same lines, we find other proposals (e.g., the Museum of Contemporary Art Chicago (MCA) and its Teen Creative Agency Program, the North Carolina Museum of Art, the TOCA (Teens of Contemporary Art) program at the Museum of Contemporary Art in Los Angeles). They all use diverse creative resources to empower young people, provide opportunities and spaces to express their ideas, and develop leadership and collaboration skills to better understand the world around them and prepare them for their future entry into the workforce.

3.3. Forms of Expression of Adolescent Creativity in Museums

What do adolescents do in museums that promote creativity both as an end and as a means to other goals? The proposals we found when reviewing the available literature are numerous and include writing, taking photographs, painting, playing, debating, designing, and composing music, among others. Below are some examples.

Sabeti [39] explored her students' capabilities by encouraging creative writing and questioning a theory of creativity that claims it resides in the properties of the objects on display through an ethnographic study. The author suggests that creativity is multidirectional and that inspiration does not come from the objects themselves, but from the people with whom they are shared. In a later work [40], she continues the idea that the artworks in the gallery inspire students to create fictional texts. During the visits, they alternate between viewing the works and providing written feedback, encouraging students to read their work. Huerta [41] examines the educational possibilities of the specific writing style of doctors, developing a study of the graphic elements of documents and analyzing an interactive exhibition where visitors are the main participants. In a later study, the same author [42] discusses the importance of museum environments, focusing on graphic design and analyzing both the appearance of the permanent collection rooms and the spaces for temporary exhibitions. These elements allow for an investigation of the image they present, and when studied from the perspective of visual culture, they enhance public receptivity and boost the creativity of secondary school students. Rolling [43] advocates for STEAM (Science, Technology, Engineering, Arts, Mathematics), believing that design-based activities promote a greater presence of art and design education during initial teacher training. He strongly supports design literacy, emphasizing workshop spaces as environments that activate students' creativity while also stimulating teachers' own creativity.

Of course, a frequent modality of creative expression in museum activities is artistic expression: painting (e.g., the Museum of the University of Navarra proposes the painting of a mural in commemoration of the 80th anniversary of Guernica), designing (e.g., the MCA invites individuals to design clothes by recycling old garments) [44], or molding (e.g., the Tate Modern in London, in its "Tate Exchange" program invites individuals to create sculptures and temporary structures using cardboard, clay and other recycled objects [45,46]).

Another form of creative and artistic expression that we find in some of the reviewed proposals is photography. For example, Duffey [37] proposes an activity in which adolescents take several photographs: three that capture key elements of the site, one that represents their personal experience, and one that reflects a path of community action. The visit includes a prior preparation phase and a subsequent phase in which the images contributed by each adolescent are reflected upon and a written essay is prepared, which they must also submit for a final group discussion. This approach allows adolescents not only to learn about the historical context of the site visited, but also to connect emotionally with the experiences of the groups represented. The use of photography as an educational tool in museums has been shown to be useful for educating the creative look [47], expressing emotions, processing experiences, and fostering self-awareness [48].

Another commonly found expressive modality is debate, often conducted through focus groups. These groups promote communication around the key variables of proposals and research, facilitate reflection, and encourage diverse perspectives. Additionally, they provide valuable information both for evaluation and in their own expressive form. Among the reviewed works that include them, we can highlight Dysthe [21] at the National Gallery of Denmark and the Youth Art Initiative program at the Carnegie Museum of Art in Pittsburgh.

Beyond forms of expression that we might consider “traditional”, Long et al. [34] carry out an analysis of learning experiences based on artificial intelligence (AI). Using a research-design approach, they developed five exhibition prototypes focused on creativity, collaboration, and bodily interaction: Magic Mirror, Sensor Wall, Neural Net, Semantic Network, and LuminAI. These prototypes aim to teach key concepts such as sensor function, machine learning algorithms, and knowledge representation. The study, conducted at the Museum of Science and Industry in Chicago, concludes by highlighting the importance of engaging communities in the design of accessible and meaningful AI educational experiences.

Finally, sometimes implicitly but always present in all proposals, museums propose experiences and tasks that invite adolescents to play, as a way to explore, express and develop creativity. In museums, playful activity is a powerful strategy to motivate young people and invite them to actively participate in knowledge and the creative process. It can materialize in the form of challenges to find ways out of a certain place, as in the popular escape games [30], games in the form of scientific experiments (e.g., Espacio Ciencia in Montevideo; Exploratorium in San Francisco), or video games (e.g., V&A Museum in London; CosmoCaixa Science Museum in Barcelona), among others. Far from being a merely playful activity, play is a powerful pedagogical tool to promote curiosity, participation, produce emotions and promote processes of reflection and symbolic construction that facilitate meaningful learning [49]. Playing helps foster observation and attention to detail, promotes active participation, social interaction, and communication, offers the opportunity to share with others, and reinterprets reality through first-hand experiences, which adolescents value highly.

3.4. Areas in Which Adolescents Express Their Creativity in Museums

Sbitnieva et al. [50] explored aesthetic education in the vocational training system for future teachers, focusing on problems such as lack of free time or lack of motivation. To avoid these problems, attention was focused on communication and organizational skills, empathy, creativity, and reflection, creating adequate aesthetic conditions for the active development of students. Shi et al. [51] analyzed the possibilities of technology (*computing technology*) in relation to intangible heritage, which entailed an increase in divergent thinking, exploratory creativity, imagination, and the possibilities for innovation in the conceptual space. They developed a compendium of possibilities that include product design and the promotion of digital cultures, aiming to encompass intangible cultural heritage, the arts, societal customs, festivals, celebrations, traditional painting, medicine, and crafts. The authors specified the contrasting perspectives of art and technology, emphasizing the potential of computer systems to engage younger audiences, particularly adolescents, due to the appeal of digital formats. Sofaer & Vicze [30] analyzed how the interventions of creative professionals play an important role in museum education. This produces a series of

questions and tensions around the relationship between creativity and authenticity, in terms of the role and limits of the evidence of space for creativity. The work explores these questions from the perspective of prehistoric archaeology, suggesting that if the role of creatives is to do things differently—to use their imagination—then museum professionals must ask themselves to what extent they agree with redesigning established narratives. According to Specker et al. [16], the findings suggest that their *Mirror Model* shows how people naturally process art, assuming that certain aspects of the model could be optimized. The authors conclude that the results replicate those of previous research, demonstrating that the aesthetic experience of art is enhanced in the museum compared to the classroom. Furthermore, the results show that the effects of presenting information in a certain order depend on the presentation context, with museum visitors recalling more art information than classroom participants.

Finally, virtual environments are also a museum reality today. DynaMus is an innovative virtual platform that allows any user to create and explore customized 3D museums through a simple, game-based interface. The project is geared toward heritage and cultural education, with a focus on game-based learning. For example, the Synthesis Museum is an educational virtual museum about Greek art, used with secondary school students. Research conducted with this platform by Kiourt et al. [52] concludes that it has great potential for autonomous exploration, interdisciplinary learning, and the development of creativity, although they found reluctance among some educational professionals to use it.

Ultimately, the areas where work in and for creativity can be contextualized are diverse and varied. These range from environments clearly linked to creativity, such as art museums, to those where the connection exists but is less obvious, such as archaeology, computer science, history, architecture, virtual museums, and more.

3.5. Evaluation of Museums' Educational Proposals

Whether creativity is conceptualized as an objective or a means in museum educational proposals, it is interesting to design a plan to evaluate the level of achievement of the proposed objectives. Evaluating the achieved impact is possible and necessary, and this evaluation allows institutional efforts to be redirected towards meaningful learning [25]. Museum proposals that incorporate educational purposes aimed at adolescents have certain inherent design limitations, but also opportunities that do not exist in formal learning environments [53]. Activities excel when they are engaging, fun, and maximize opportunities for collaboration [54]. "Learning" in these settings is not strictly focused on the acquisition of content knowledge, but also addresses socio-emotional factors such as enhancing perceptions of a field or topic, fostering the development of interests, and providing memorable and inspiring experiences [55].

For example, the aforementioned Ohio CMA articulates its social mission through the promotion of creativity, and its approach to assessing impact is based on formative and reflective evaluation, based on the formulation of explicit learning outcomes, questionnaires based on these outcomes, and the collaboration of part-time evaluators and hired external expert evaluators. The processes of observation and qualitative analysis allow them to adjust proposals and decisions based on the collected evidence. Among the most commonly desired learning outcomes are: (a) knowledge and understanding, (b) skills, (c) change in attitude and values, (d) enjoyment, inspiration, and creativity, (e) action, behavior, and progression [56]. At the aforementioned museum, the "Game Show" program, although well received, was canceled because the evaluation indicated that it did not sufficiently encourage creative thinking. Instead, the "Connector Series" program, which facilitated collaboration between visitors and artists, did achieve positive results by facilitating collaboration and significantly improving creative thinking among adolescents.

The Active Prolonged Engagement eXpanded (APEX) aims to be a framework for understanding and qualitatively evaluating how visitors interact with specific museum exhibits on a social, emotional, physical, and intellectual level [53]. It helps assess the effectiveness of museum designs that aim to foster active engagement, collaboration, and learning, including video recordings,

behavior coding, coding and analysis of visitor interactions, opportunities for improvement, observation forms, etc. It has been used in various museums such as the Museum of Science and Industry in Chicago (MSI), and in various proposals for adolescents such as Blockhead, GrooveMachine, or Sound Happening, actively helping to optimize all of them.

Poce et al. [57] explored the impact of “tinkering” as an informal educational methodology for strengthening 21st-century skills, especially critical and creative thinking. Participants in the study were museum educators and teachers. Creativity was assessed through classic divergent thinking tests, written exercises (e.g., text commentary), circuit design exercises, and a final artistic activity which included drawing with light in dark rooms. The results found significant improvements in creative thinking, especially in the dimensions of fluency and flexibility of ideas. However, they found no relevant differences in other variables such as critical thinking, and improvements were considered “only slight” in variables such as argumentation and critical evaluation.

The DECHADOS project was created to assess how collaboration between secondary schools and museums in Spain promotes the creative look, thinking, and performance of students in that educational stage [42]. Museums such as the Fine Arts Museum of Valencia, the IVAM (Institut Valencià d'Art Modern) in Valencia, the Itsasmuseum Bilbao, and the TEA Tenerife Espacio de las Artes are included in this study. The results, based on feedback from adolescents after their visits, show that the efforts made by these institutions partially achieved their objectives. The strengths lie in how much young people enjoy, value, and report learning from these experiences. However, museums need to improve in helping young people see these experiences as closely related to their daily lives and in fostering their self-perception of attitudinal change.

The importance of these evaluation proposals is crucial, as we find that not all museum proposals related to creativity include effective methods for receiving feedback and adjusting their plans, as well as assessing how closely they have met their objectives. The presence of evaluation plans shows the museum's commitment to understanding the real impact of educational proposals and is essential for its potential for change, progress, and improvement [25], ensuring pedagogical relevance [32], and justifying the resources received and institutional legitimacy.

4. Conclusions

A review of recent scientific literature (2014-2025) that encompasses concepts such as creativity, museums, teacher training, and secondary education has allowed us to compare the available information and outline the current state of the art. This reflection has further allowed us to identify five key areas of the relationship between creativity and educational action in museums: creativity as an end, meaning museum initiatives aimed at fostering creative attitudes, thoughts, and behaviors in adolescents; creativity as a means to promote specific learning and development in this group, such as empathy, social values, feelings of belonging, and self-esteem; the various creative activities that adolescents are encouraged to practice; the diverse contexts in which creativity is explored in museums, including history, archaeology, art, psychology, design, and video games; and the different methods for assessing and evaluating existing proposals, such as questionnaires, feedback from adolescents, external evaluators, and internal training for evaluating proposals. It is essential to focus on and leverage the voices and opinions of adolescents themselves, not as a complement, but as the core of institutional transformation. Evaluation processes are essential for rethinking the role of museums as spaces for co-creation and social dialogue, through ethical, collaborative, and decolonial practices [27]. Among the most effective strategies to achieve this are the use of emerging technologies such as augmented reality, geolocation, and AI, game dynamics based on clues and puzzles, and the integration of emotional content that promotes connection with the objects on display. This is a challenge for museums given that it requires management challenges, such as adapted marketing strategies, audience segmentation, and training heritage professionals to integrate technological and participatory approaches [33].

Among the limitations of this work are the fact that certain experiences in museums around the world were not included, as they were not supported by research projects that led to publications in

specialized journals, or because these journals were not published in English or Spanish. However, we are convinced that the examples included provide a valid insight into the reality of the relationship between creativity and museums today.

Working for, with, and through creativity in museum spaces presents significant challenges. These include hierarchical institutional structures, the pressure to meet predefined educational objectives, and the tension between the museum's authority as a cultural institution and the desire to foster active and equitable public participation. Educators, whether museum staff or employees, must have specific skills to facilitate authentic dialogues that are sensitive to visitors' cultural, linguistic, and social differences. Thus, museums and their staff, in addition to working with creativity on a daily basis, must develop their own creative potential. We agree with Yu [31] that examples of education in, with, and for creativity in museums can serve as a guide for the implementation of multicultural education—a comprehensive and open education based on the great potential of creativity as a gateway to adolescents' personal development and a better future for our society.

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Appendix A

Table A1. This is a table caption.

AUTHORS	OBJECTIVES	PARTICIPANTS	DOMAIN	PROCESS	CONCLUSIONS
Álvarez-Rodríguez, et al., (2019)	Analyze training in mediation and education in museums		Heritage education / Educator training	Bibliographic review	Museum education is an emerging area; greater connection with academia is needed
Cesário & Nisi (2023)	Designing engaging mobile experiences for teens in museums	223 teenagers, 3 museums, 12 professionals	Museology / Design of interactive experiences	Co-design sessions and testing with augmented reality	Gamification and interactivity are key to engaging teens
Crabbe, et al., (2022)	Exploring youth's creative disposition in museums through YPAR	Teenagers in mentoring programs in the U.S.	Inclusive Education / Art Museums	Participatory research with young people to reimagine museum practices	YPAR empowers youthful disposition and challenges superficial discourses of inclusion.

Duffey (2024)	Develop ethnocultural empathy	Teenage students	Emotional Education / Museums and Historical Memory	Visits to historical sites, photography, written reflection, and debates	Immersive experiences strengthen empathy and multicultural competence
Dysthe (2021)	Analyze dialogic pedagogy in art museums	Teenage students	Art Education / Museums	Qualitative observation of pedagogical sessions and workshops	The dialogical approach favors subjectivation, but involves implementation challenges
Echarri (2019)	Promoting peace education through art in museums	946 people (aged 3 to 103), including adolescents	Art Education / Museums	Collaborative recreation of 'Guernica' at the Museum of Navarre	Collaborative art can generate meaningful experiences of peace and community
Echegoyen-Sanz & Martín Ezpeleta (2020)	Analyze creative educational materials developed by future teachers	Adolescents and pre-service teachers	Art Education / Museums	Qualitative analysis of materials produced after exhibitions	Future teachers demonstrate creativity and diversity in their educational proposals
Foley (2014)	Exploring creativity as a social mission of museums	Educators and visitors at the Columbus Museum of Art	Art Education / Museums	Implementation of an educational framework focused on creativity	Creativity is essential for learning and social change in museums
Huerta & Rodríguez-López (2025)	Evaluate collaborative artistic experiences in teacher training	Teenagers and student teachers	Art Education / Teacher training	Art installations in museums with Arts-Based Research	Active involvement in museums fosters creativity and critical thinking in future teachers
Huerta (2014)	Exploring medical calligraphy as a creative stimulus in museums	Teenagers and visitors to the 'Doctor's Letter' exhibition	Art Education / Visual Culture	Case study with direct observation and active public participation	The exhibition promotes collaborative and meaningful experiences through visual culture
Huerta (2024)	Analyze the impact of graphic design on creativity during school visits	High school students	Graphic Design / Museum Education	Observation of the graphic environment of 7 museums.	The design of spaces directly impacts the creativity of visitors
Kiourt, Koutsoudis, Pavlidis (2016)	Develop a dynamic, accessible and creative virtual museum	Unspecified case study users	Educational Technology / Virtual Museums	Design and testing of the DynaMus platform	The system allows for the creation of personalized virtual exhibitions, promoting interactive education
Long, Blunt & Magerko (2021)	Designing AI literacy exhibits in informal museums	20 people (9 adults, 11 children and	Informal Education / AI / Museums	Prototypes and co-design workshops with	Collaborative, creative, and embodied displays

		teenagers) in family workshops		qualitative analysis	foster understanding of AI
Long et al. (2022)	Developing a framework for evaluating collaborative exhibit design	Visitors to interactive exhibits like TuneTable	Informal education / Interactive museums	Case studies with video analysis and observation using the APEX framework	The APEX framework enables informed, user-centric design decisions
Melgar, et al., (2022)	To study young people's perceptions of educational experiences in museums	89 young people and 3 museum educators	Non-formal education / Youth	Online questionnaires and semi-structured interviews	More interactive and motivating proposals for adolescents are needed
Noble (2021)	Exploring creative approaches to museum learning during the pandemic	Educators, teachers and students	Digital Education / Art Museums	Development of digital resources and remote programs	Participatory creative pedagogy facilitates inclusive encounters even in digital environments
Peters (2020)	Analyze Virgil Abloh's exhibition and its impact on fashion curation	Young audience	Fashion / Contemporary Curatorship	Exhibition critique from a cultural theory perspective	The exhibition redefines the museum experience with a youthful, urban, and commercial focus
Poce, et al., (2019)	Evaluate the impact of Tinkering on critical and creative thinking	30 museum educators and STEM teachers	STEM Education / Science Museums	Two-day workshop with pre- and post-test	Improvement in creative thinking; slight improvement in critical thinking
Ponce & Morais (2020)	Evaluate the impact of museum educational programs on children's creativity	Children, adolescents, parents and museum managers	Informal learning / Creativity	Interviews, workshop observation, institutional analysis	Museums must go beyond leisure and integrate meaningful educational processes
Rolling (2016)	Reclaim STEAM education by integrating art and design with science and technology	Art and design educators and students	Art Education / STEAM	Essay based on historical references and educational practices	Art is central to STEAM; it promotes creative solutions and divergent thinking
Sabeti (2015)	Exploring creativity in writing from the perspective of public museum pedagogy	Young people and adults in a writing class	Non-formal education / Creative writing	Long-term ethnography, interviews and observation	Creativity arises from human relationships, not just from art objects
Sabeti (2016)	Study the creative writing process within a museum	'Painting Words' Writing Class	Anthropology of Creativity / Museums	Five-year ethnography: text analysis, interviews, and field notes	Creative writing is a relational and social process, not a solitary one
Santacana et al. (2016)	Analyze adolescent perceptions of cultural inclusion/exclusion in museums	Secondary school students	Heritage Education / Adolescence	Qualitative study in museums; surveys and interviews	Teenagers perceive museums as exclusive; they demand active experiences

Sbitnieva et al. (2020)	Analyze aesthetic education in the training of modern specialists	260 young people	Higher Education / Aesthetic Appreciation	Evaluation with surveys and psychological methods	Aesthetic education strengthens the culture, creativity and harmonious development of the student
Schmidt, et al., (2019)	Using photography to promote professional identity and multicultural awareness in counselors	High school and college students	Emotional Education / Expressive Arts	Creative activities with photography for reflection and training	Photography encourages self-exploration and professional development in future counselors
Silveira et al. (2020)	Identify strategies to motivate adolescents in Espacio Ciencia (Uruguay)	12 museum guides and visiting teenagers	Informal science education / Mediation	Quantitative survey of guides on applied strategies	Adolescent motivation requires active strategies; the role of the guide is key
Sofaer & Vicze (2020)	Exploring creativity and evidence in archaeological museums	Museum and creative teams in 4 Danube countries	Museology / Archaeology / Participatory Art	Development of live games based on prehistoric sites	Creative collaboration enables new forms of educational interpretation
Soto-González, et al., (2025)	Investigate connections between museums, universities and schools	18 experts from 19 institutions	Interinstitutional Education / Museums	Qualitative interviews on educational links	Museums are key educational spaces; innovative institutional collaboration is required
Specker, et al., (2017)	Investigating the aesthetic experience in museums and laboratories	Students and visitors	Psychology of art / Aesthetic education	Two comparative studies using the 'Mirror Model of Art'	The aesthetic experience is more intense in museums; the model improves understanding and retention
Sylaiou et al. (2017)	Explore the educational impact of technologies in virtual museums	164 virtual museum users	Educational Technology / Virtual Museums	Analysis of 5 virtual museums with a survey based on generic learning outcomes	Technologies influence the educational experience; a new analysis methodology is proposed
Yu, Yi-Ling (2021)	Explore aesthetics as perceptual knowledge in art education	Students at the National Museum of Fine Arts	Art Education / Contemporary Aesthetics	Experimental art and aesthetics program with a cultural focus	Aesthetic education develops creativity and critical thinking in multiple dimensions

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