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Transmedia Narratives in Education: The Potentials of Multisensory Emotional Arousal in Teaching and Learning Contexts

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Abstract

The role of the teacher has radically changed with the introduction of digital media in the different stages of the educational process. The teacher is not the deposit of knowledge anymore but acts as a dramatist that creates transmedia narratives to engage students in their access to knowledge. Teaching and learning experiences are a complex formed at least by visual, auditory, and verbal stimuli combined in specific modes stimulating multilayered sensitive emotional experiences. These experiences should be conceptualized as one interconnected complex as far as students need to develop tools for interpretation, negotiation, and meaning-making of the information they are constantly exposed to. This contribution presents an interdisciplinary pedagogical project that used transmedia narratives in the field of art education, stressing on the potentials of multisensory emotional arousal that increases the likelihood of memory consolidation, the process of creating a permanent record of the encoded information.

Keywords: teaching and learning contexts, multisensorial information, content meaning-making, emotions, art education

1. Introduction

The role of the teacher within the different stages of the educational process has radically changed with the introduction of digital media. The teacher is a facilitator, tutor, and counselor, not anymore a deposit of indisputable knowledge that has to be absorbed by the students. The amount of factographic data that is, through new media, at the disposal of teachers and students is today unmeasurable. Yet facts do not represent knowledge. Knowledge arises with an interconnection of facts with a specific meaning. What to do, and how to use these facts, is the main question addressed to teachers as facilitators within the educational process. That is why the process of teaching and learning is not any more unidirectional. Instead, the teacher acts as a dramatist that creates narratives to engage students in their access to knowledge. He/she depicts contents and creates interdisciplinary connections, choosing what to present as relevant and what to leave aside because it would not work in the context of his/her narration.

Many of these narratives are transmedia narratives especially in the cases when multisensorial experiences are regarded as agents in expanding the possibilities of cognitive, affective, and psychomotor development of the students, creating an actual community of knowledge [1].

The narratives that can be created in the context of a teaching-learning process have evolved alongside the technical means today available. Narratives are no longer restricted to a textual form and could be transmitted and received as an audiovisual product and have a significantly wide palette of forms appealing to a larger portion of the senses and allowing a better immersion in the world they present while requiring less effort on behalf of the audience. However, narrations are a communicative process, and as such it depends on the audience and its reaction. We could argue that a functioning narrative reflects not only the storytellers' perceptions but also the perceptions of the audience [2].

Teaching and learning experiences are a complex formed at least by visual, auditory, and verbal stimuli combined in specific modes, stimulating multilayered sensitive emotional experiences. These experiences should be conceptualized as one interconnected complex as far as students, as stated before, need to develop tools for interpretation, negotiation, and meaning-making of the information they are constantly exposed to. Taking into account that in a rapidly changing world it is not possible to conjecture what kind of knowledge will students need in their future lives, these experiences are highly relevant in any educational process. They need to be given tools for future interpretation of facts. Bare facts are meaningless for them.

In the field of art education, which is our research area, it is worth noting in today's school the fact that the majority of the pupils is in daily contact with digital media with its colorful, fast-moving sequences of images and, of course, computer programs that provide a wide range of possible uses and experimental experiences. Scanning and combining images, exploring the possibility of multiple printings, and the divergence between printed and screen images are only a few possible areas to consider. Numerous images are produced with widely available, highly interactive, and user-friendly software. These experiences do not only imply increasing speed of changing images, mechanical simplicity, and wide possibilities in the resolution of different technical processes but, perhaps most of all, a specific experience of space perception and representation, which every student carries with himself or herself to the classroom and is essential to education in general and to art education in particular, not to mention the fact that artworks can be easily shown in digital social media as Facebook, Instagram, YouTube, and others, creating new forms of artistic dialogs that were unimaginable two decades ago.

Digital media is also making new and unique aesthetic experiences possible and changing the way in which art is conceived, created, and perceived. A new world has opened for artists as well as educators. Technological development requires the teaching profession to make changes at an unprecedented rate and opens a wide number of questions. Those connected with the impact of transmedia narratives via multimedia technologies on students are relevant to teaching as well as to artistic practice.

2. The pedagogical process of art education

The goals of art education at all stages of education programs in general include the development of observation, space representation, creativity, imagination, the knowledge of contents from artistic theory and history, artistic techniques, and processes and materials, always rendering a direct relationship between practice and theory.

Learning takes place in two phases: perception, which includes acquiring the information, and processing, which includes storing and making sense of the information. There are different ways or modalities in which information is perceived and processed. The ways in which information is perceived by the learners are concretely, such as feeling, touching, seeing, or hearing, and abstractly, such as mental, visual, or conceptual models. Processing the information perceived is the next step: learners process the information by active experimentation, doing, manipulating, or using the information and reflecting upon or thinking about the information.

Within art education, the teacher should enable gradual learning, on the basis of perception, experiencing and understanding, and processing of this information using visual signs in creative art expression. That is why it is very important for all students to enrich the development of their manual skills and orientation, to experience with gradual understanding of visual art concepts and rules of visual signs' use within the visual art education process.

Solving design problems at any educational stage implicates a special connection between three inseparable aspects of the artwork: the theoretic problem, the motif, and materials and art techniques, each focusing on the cognitive, affective, and psychomotor aspects of the task or problem to solve. Problems also enhance critical evaluation, and students are independent at finding original solutions to the demanded tasks.

2.1 On creativity

Art education is one of the core subjects that enhance the development of creativity by each individual student. Its activation is the key for transfer to other school subjects and fields.

Within art education it is common to evaluate the results; many times the process remains unassessed. Many definitions of creativity also focus on it from the point of view of the results. These definitions are still current in many aspects of activities linked to art, like critics, market, and the construction of art history, but in the context of art education, it is more accurate to consider the teaching-learning process that deals with creativity. In art education, creativity has more to do with the ability to find proper strategies in order to solve problems than with the characteristics of a final product.

Many authors point out different aspects linked to the requirements of creativity: Bruner [3] believes that individuals differ by the way they collect information. If someone collects a wide palette of information, he/she is not directed to convergent production only. Dörner [4] thinks that the influence of the environment is a key for creativeness. The motivation of an open, free, and exciting context is the key for creativity. De Bono [5] links creativeness with lateral thinking, similar to Guilford's [6] definition of divergent thinking, considering the possibility to enrich primary perceptions. He thinks an individual is creative if he/she can successfully present his/her specific and unique perception of the word which is dependent on the amount of information he/she gets and the way he/she is able to process it. Trstenjak [7] links creativity to different structures of thinking: creative thinking is the result of cooperation between heuristic and epistemic structures of thinking. Torrance [8] sees creativity as a conglomerate of abilities, skills, and motivation.

Karlavaris [9] defines six factors of artistic creativity which function as a concentrate of artistic competencies: originality, which means unusual strategies when solving problems, sensibility in discovering problems and understanding aesthetic structures, imagination in the redefinition of the role and value of elements, aesthetic elaboration and planning of ideas and solutions, fluency of ideas, and flexibility in the arrangement of the means of expression. What

is particularly outstanding in this definition is that creativity in art education focuses on processes as well as on final products. In this way it is possible to take into account the different attitudes, interests, and affinities of the various actors in the pedagogical process.

It is not easy to define the criteria to describe creative practices. The resulting artwork is the basis for a precise description of the process that originated it. It is also the product of a connection between the engagement of the teacher and the engagement of the student. Nevertheless, many times this relation is not proportional. A teacher can invest huge efforts in motivating a student, and because of many reasons, the student cannot reflect them in his/her work. The opposite is many times present. Internal motivation can play an important role in students' performance regardless of the teacher's attitude.

"Creativity, if believed to mean originality, imaginativeness, ingeniousness, innovation, inventiveness etc. is also linked to a certain positive understanding of the creative power. This is applicable to students and teachers as well: positive experiences motivate new creative engagements" [10].

2.2 Types of students

Departing from the definition of transmedia or cross media narratives as experiences distributed by a variety of different media channels, creating pieces with different contents out of one story, it is relevant to define different types of students if we wish to engage them within this particular educational process.

Differing from multimedia, in which a single content is presented by a variety of media forms as audio, text, or visual material, transmedia concentrates on the possibility that a content gets an unpredictable number of meanings and uses during its process of transmission through different media channels. In a world where individual students use these media in different ways, depending from their individual needs and abilities to manage them, and have different forms of access and experiences with them, the multisensory experiences provided by multimedia are not enough to assure a creative use of the contents a teacher wishes to make his/her students familiar with. Individualization is something that should not be overlooked or missed. Relying only on multimedia means a limitation in managing didactic means as resources in the process of teaching and learning.

The learning styles of students depend on several factors, including their environment and other cognitive and emotional factors. Students retain and process information differently. Allowing them to access and process information in terms they are comfortable with increases their academic confidence, motivation for leaning, and interest.

In general, we can identify four primary types of learners: visual, auditory, writing, and kinesthetic.

Visual learners prefer to take in information using images like charts, maps, graphs, diagrams, or any pictorial material. However, this type of learning style does not include photographs or moving images. Instead, visual learners learn best when information is presented using patterns, shapes, and other visual aids in the place of written or spoken words. Auditory students learn best when information is heard or spoken. They benefit from lectures, group discussion, and other strategies that involve talking things through. Students who have a writing preference prefer information to be presented using words, emphasizing text-based input and output, taking notes to better retain the information. Kinesthetic learners learn best when they can use tactile experiences and carry out a physical activity to practice applying new information, recreating experiments to illustrate concepts [11].

Knowing how to address the learning needs of individual students is an important part of creating meaningful classroom experiences and helping them retain what they learn.

The key activities of the learning process are perception and process in terms of action—perception and processing. Each can be divided into two sides: the use of experience of the senses and the abstract detection of information using mental or visual conceptualization. Once students get the information, they need to process it. Some do this by actively experimenting on the basis of information, others by reflecting about it.

Following Kolb's [12] model of experiential learning, we can detect students' preferences regarding ways of reaction and behavior in the case of different given tasks. The author distinguished four types of students: activists, thinkers, pragmatists, and theorists.

Activists or adaptable accommodators are students who actively experiment and swear on the specific experience in every artistic work, relying on intuition more than on logic, and although they can react to unexpected circumstances, it may happen that they are too late to complete the given task or they are overly satisfied with a result, which could be significantly better. In this case, the teacher must show the student different opportunities that he/she did not preview, directing him/her to a proper evaluation of the result.

Thinkers or divergents are students who always come from a concrete experience on the basis of which they reflect on the presented facts and look at things from different angles, ending to gather information and use imagination to solve problems. They are very wide, but they prefer to exactly observe a phenomenon more than to operate on it. The teacher should help to synthesize various information and direct it to a unified project in which all elements of rich observation should be present. It is necessary to show that the artistic task is realized only in the artistic product and that each solution is interesting in its own way. It is necessary that students learn to carry out the ideas to the end.

Pragmatists or convergers are students who actively experiment and form an empirical understanding of the problem and an abstract conceptualization of it, look for useful aspects of learning, and react quickly and deal with things as they would always be a technical problem to be solved. In this case, it is necessary that the teacher points out to all the diversity of the components of the artistic activity, directing the students to an emotional attitude toward the solution of the artistic task. In this way students have the opportunity to discover other aspects of work and their own personality.

Theorists or assimilators are students who first think and then abstractly conceptualize synthetic and logical types, abstract ideas, and concepts. Logical interpretations are for them the most important aspects of solving a task. Practicality is less important than a good logical explanation. They can create theoretical models and render them inductively. In this case, it is also necessary to emphasize the practical aspect of solving the artistic task [13].

Seagal and Horne [14] have developed a three-dimensional model, stressing on the mental, emotional, and physical dimensions of learning. The mental dimension is related to thoughts, values, objectivity, concentration, and abstract conceptualization. The emotional dimension means connecting, organizing emotionally, and communicating. The physical dimension is related to manifestation, production, and activity-oriented skills. The three dimensions actually work together, but usually one is more pronounced than the others. For example, if students work better in the mental dimension, they will think about the content of the problem; if they are emotionally relational oriented, they will skillfully organize parts of the problem, but if they are physically oriented, they will actually try to solve the problem [15].

Models represent only a basic orientation in the detection of personal learning characteristics. If we compare the three-dimensional model with Kolb's four-type model, it is noticeable that the same characteristics are repeated: the experience of the problem, the reflection on it, the analysis, and the activity or application. Although every strict classification of students from the point of view of work in a concrete class is almost impossible and pointless, these are definitely welcome descriptions of the different approaches and modes of work. In the case of artistic design, the possibility of identifying the individual way of work and the inclination of each student is extremely valuable since each student is practically involved in fine arts in different ways. The teacher must be prepared in such a way that he/she can advise and objectively evaluate the work of each student. Identification of characteristics and deficiencies means that the teacher, together with the student, can find the most meaningful way in carrying out the entire activity.

Taking into account learning modalities is a sensible starting point because it emphasizes the construction of the learning process on the basis of individual experiences and findings of each student. These models offer the theoretical framework within which it is easier to operate, especially if we take into account all the factors that directly and indirectly influence the learning process as are the material conditions, the number of students, the characteristics of the organization of lessons, and, last but not least, the personality of the teacher.

2.3 Attention, emotion, and creativity

Transmedia narratives in the field of education are many times interdisciplinary pedagogical projects that stress on the potentials of multisensory emotional arousal which increases the likelihood of memory consolidation, the process of creating a permanent record of the encoded information. Being attention and emotion parts of the cognitive process that is implied in learning, it is important to mention them as core elements in the design of a pedagogical process.

Emotional arousal is a mental state associated with thoughts, feelings, behavioral responses, and positive or negative experiences. In the pedagogical field, it is linked to the motivation of learners and their particular learning styles. Cognition, especially from the point of view of the interpretation of events or data, is an important aspect of emotion which is essential in the process of learning [16].

Any environment is a complex which offers many aspects and point of reference which we can or do not notice depending on our previous experiences, interests, and sensitivity. We focus our attention on certain phenomena and disregard for other. It is practically impossible to become aware of all the elements and details our surrounding space contains. Attention is thus a cognitive process in which we select what to concentrate on.

Because it is strongly linked to our previous experiences, it is sometimes unrelated to the external elements of the environment, but it could be stated that it is more a phenomenon referred to as mind-wandering or spontaneous thought [17].

Depending on the investigation point of view, definitions of attention recurrently concentrate on different aspects of it. It is possible to differentiate focused, sustained, selective alternating, and divided attention. Focused attention is the ability to react to specific visual, auditory, tactile, or other stimuli. Sustained attention is connected to the ability to maintain a consistent behavioral response during continuous and repetitive activity. Selective attention refers to the capacity to maintain a behavioral set in the presence of distracting or competing stimuli. Alternating attention refers to the competence for flexibility in shifting focuses of attention when tasks require different cognitive responses. Divided attention refers to the ability to respond simultaneously to multiple task demands. These different modes

can be applied in the research of perceptual issues. Overt attention means directing sense organs toward a stimulus source. Covert attention is the act of focusing on one particular part of several possible sensory stimuli.

Basically these processes involve maintaining behavioral goals as a basis for choosing what aspects of the environment to attend to and how to carry out actions in this context to achieve any aims. Emotionally salient stimuli automatically capture attention [18].

Emotionally arousing stimuli compared to neutral stimuli result in heightened memory for particular details, key to get the meaning of the emotional stimuli and diminished memory for peripheral details. Excitement may also increase the duration of attentional focusing on the thrilling stimuli, delaying the disengagement of attention from it.

Emotional items are easily processed when attention is limited, suggesting a prioritized processing of information. When attention is limited, arousing items are more likely to be processed than neutral items [19].

In addition to its effects during the encoding phase, emotional arousal increases memory consolidation during the retention and storage stage of memory. In this way, the process of creating a stable record of the encoded information is enhanced. Establishing links between new and stored information is a process of elaboration. Association of data stimulates memory. Of course, this process can disrupt memories for peripheral details. The almost automatic attentional modulation of memory for arousing information, memory for non-arousing positive or negative stimuli may benefit from conscious encoding strategies as elaboration is [20].

These processes are extremely complex in everyday life environments without boundaries, where we are exposed to an extensive amount of information we cannot easily and unambiguously perceive, decode, and encode. Stimuli are combined in specific multilayered unpredictable sensitive modes.

Perception in these cases is affected by a conjunction of factors which include the characteristics of the visual and auditory search, attention and emotions, memory, previous experiences, and the individual capacity to rationalize emotional processes that allow decoding signs in the environment.

In fact, we are overloaded by the huge amounts of data that our environment contains. The impossibility to control this situation means that we may many times perceive things we otherwise would not. Actually, many of our perceptions are forced by intentionally created stimuli that could impose certain actions and beliefs [21]. Any highlighted event can limit our attention. Any perception can control our emotions. These facts are of crucial importance within the educational process.

Transmedia narratives traditionally refer to telling a story across multiple platforms, allowing audience participation, such that each successive platform heightens the audience's enjoyment. Pratten completed this definition stating that this means taking the audience on "an emotional journey that goes from moment-to-moment" [22]. This definition is particularly relevant if we consider how important is, in the endless possibilities of getting information teachers and students have at their disposal. To decode, select, and make a suitable meaning from them is a process that primarily engages emotions and attention. Emotions lead to attention; thus they are an important internal motivation tool in the teaching-learning process. Without motivation teaching and learning are practically impossible.

2.4 Didactic means based on multimedia

A teaching-learning process is practically impossible to conceive without using proper didactic materials. They can be defined as materials that the teacher uses during the teaching process as teaching means, for the students who acquire knowledge; they are learning materials.

Today multimedia materials are widely used, replacing the traditional forms of printed produced material for students.

Many researches have been held about the use of multimedia technologies and their increasing role in education. The term multimedia specifically refers to the combination of multiple technical resources for the purpose of presenting information represented in multiple formats via multiple sensory modalities. Accordingly, multimedia resources can be considered in three different levels: the technical level (the technical devices such as computers, networks, displays, etc. that are the carriers of signs), the semiotic level (the representational format such as texts, pictures, and sounds of those signs), and the sensory level (the sensory modality of sign reception such as visual or auditory modality). Many researches indicate that multiple external representations and multiple modalities are not always beneficial for learning [23]. Another theory [24] states that students learn more deeply from words and pictures than from words alone, that they learn more deeply when extraneous material is excluded rather than included, and that they learn more deeply when printed words are placed near rather than far from corresponding pictures. Other authors [25] state that adding pictures to a text may not always be beneficial for learning but may have negative effects if poorly matched to the learning task.

In spite of the fact that moving images suppose realistic elements connected with the perception of space, many authors [23–25] think that in many cases they do not foster improvement in learning because they cannot replace the value of other spatial-visual representations like schemas in the case of learning contents about the nature of features that show systemic organizations.

In fact, it is possible to ground the inquiries on the ways learning will presumably change within investigations such as those held by Lewalter [26], who questions the assumption that animations result in better learning than static pictures and examines whether the two kinds of visual displays lead to different cognitive processing. She argues that the difference between their respective cognitive processing demands is twofold. On the one hand, directly supporting the construction of a dynamic mental model through an animation may reduce the load of cognitive processing. On the other hand, the transitory nature of dynamic and audible visuals may cause higher cognitive load because learners have less control of their speed of processing.

In the field of art education, we should generate and use didactic means that base on animations with dynamic, moving images and sound. Reception of dynamic images requires a special predisposition because they function as reduction of authentic spatial experiences.

Multimedia images involve the immersion in a virtual reality. Virtual reality supposes a sensor-motor exploration of an image or space that gives the impression of a living environment. It becomes a multisensory interactive space of experience in real time. The majority of virtual realities that are experienced mostly visually isolate the observer from external visual impressions, please him or her with images that imitate the plastic characteristics, scale and color of real objects, expand the perspective of real space into illusion space, and use light effects to impress the observer making the images appear as real. Another important element within virtual realities is sound. Sound informs us about sources and events, and in spite of the fact that our primary perceptions suggest that all material objects are visual, what we see is many times directly related to what we hear or should hear.

"The expression virtual reality is a paradox, a contradiction in terms, and it describes a space formed by illusionary addresses to the senses. Virtual reality is in essence immersive. Probably the most important aspect we should take into account is the fact that they so frequently demand different modalities of perception" [27].

It is highly important to design suitable didactic tools taking into account the goals we wish to achieve during art education lessons. We should take into account that dynamic images may foster a singular spatial experience but they may also impact negatively on students that have difficulties to express themselves in three-dimensional representations of space. In such cases they can result in oppression and insecurity, creating a class climate that does not support their learning processes.

Educating students about arts and culture focusing on vision as the main source of perception or as the only element that could foster improvements in the development of spatial representation, putting aside a holistic conception of perception or relating only on traditional artistic disciplines, would not offer them the necessary competencies and operative experiences they need to develop in the world nowadays. We should consider the individuality of each student and his/her necessities, affinities, interests, cultural background, gender, etc. Multimedia experiences are also important for other school subjects as most of them use visual and auditory representations of different kinds. The development of the ability to imagine spatial relationships is especially important in the fields of geometry, geography, biology, physics, or chemistry.

Individualization within the pedagogical process is today a key commitment for the teacher. Taking into account the different ways in which students learn best, visual, auditory, reading/writing, kinesthetic, and the learning styles regarding the ways in which students deal with their experiences, is of primordial importance when designing multimedia didactic material for the class and planning transmedia educational strategies.

3. Interdisciplinary approaches: aspects of cross-curricular integration

An interdisciplinary approach means the acquisition of certain skills that are common to different subjects or disciplines. The transfer values of these skills allow them to be transferred to other areas of knowledge. An integrated form of interdisciplinary approach compares contents and concepts that are common for various areas. It is a meta-curricular approach to the development of mental abilities, social skills, multiple intelligences, technology, and learning abilities through different disciplines.

The processual aspect of interdisciplinary strategies emphasizes the integration of processes and learning objectives. It is realized on the basis of conceptual, learning-targeted, and process-development planning. The conceptual design concept is the concept or principle of knowledge. Knowledge of different subject areas is linked to concepts in order to establish a transfer of thought strategies. On this basis, creative solving of problems in various subjects and the promotion of higher levels of mental skills can be carried out [28]. This model stems from the assumption that the critical thinking capabilities need to be developed to structure, classify, and develop or achieve desired results based on conceptual structures. Content and learning processes are intricately intertwined, although the teacher many times derives from a known connection of contents between different subjects. The result shows the equivalence of content and process goals. Drake [29] also agrees with this approach, as he says that the brain is organized to receive more information simultaneously and that holistic information can be easily and quickly recalled in memory.

The ideological assumptions that form the basis of our school system point to the advantage of subjects that express logical-analytical-mathematical thinking and the ability of verbal expression, while artistic-aesthetic experience and expression

are pushed into the background. The system clearly gives priority to the development and use of the left brain hemisphere. The recognition that both hemispheres do not function separately but effectively complement their functions leads to the conclusion that priority should be given to such processes that integrate the ability of both brain cells. Gardner's [30] multiple intelligence theory, which distinguishes linguistic, musical, logical-mathematical, spatial, motor, interpersonal, and intrapersonal intelligence, supports cross-curricular integration. Children should be able to develop all seven intelligences, as this is the only way to discover and exploit their potentials. Undoubtedly, cross-curricular integration supports these processes because experience shows that students are developing interest and motivation for learning in the course of cross-curricular integration and deepening understanding and use of knowledge.

With art education the teacher also develops a very important component of personality, artistic creativity, and through it also creativity in general, which today is an irreplaceable development factor of the individual and the society. The promotion of artistic creativity includes the promotion of originality in the artistic product, the use of material, procedures and methods of work, the sensitivity of perceiving artistic qualities, the complexity in the transformation of art products and materials, the complexity of ideological aesthetic design, and the solution of artistic problems and flexibility. Interdisciplinary links between logic and artistic subjects have proven to be a good starting point to develop the logic thinking needed to solve rational problems like how to use artistic material from a technical and technological point of view as well as the creative thinking needed to find paths to solve analytical problems within natural sciences.

To express this need for a wider approach to knowledge in the words of Eisner [31], "The arts make vivid the fact that neither words in their literal form nor numbers exhaust what we can know."

4. Multimedia experiences as components of transmedia narratives

Teaching and learning experiences should be conceptualized as one interconnected complex stimulating multilayered sensitive emotional reactions as far as students need to develop tools for interpretation, negotiation, and meaning-making of the information they are exposed to. They need to be given tools for future interpretation of facts. Bare disconnected facts are meaningless if they are presented in a context that does give way to a holistic representation of the world.

Any material can be easily shown in digital social media as Facebook, Instagram, YouTube, and others, creating new forms of dialogs among their users. This implies that it is not possible to conjecture the destiny of any material posted in such media and the reactions it can produce. Many specific stories can be created out of the departing point that any posted material is. These narratives are transmedia narratives that eventually use multiple forms of media that deliver a unique content through different channels. These experiences, even if we would justly conjecture that they are impossible to control in the sense that we cannot easily assess and evaluate the results, are highly relevant in the educational process.

Multimedia production gives voice to students who are otherwise silenced in their schools and communities. It allows students to represent their experiences as cultural insiders, instead of the incessant misrepresentation of them by media producers outside their communities. A story, then, is performative, born both through a process of self-reflection and meant specifically to communicate to another. A story is a representation of an experience, one which is crafted in particular ways and media to represent particular insights and emotional significance. The

emotional work of multimedia storytelling for the students is linked to the developing sense of being social subjects who can inquire into and act upon the world. This idea suggests the social significance of such approaches to learning [32].

On the other side, the teacher is not the deposit of knowledge anymore but acts as a dramatist that creates narratives to engage students in their access to knowledge. In fact, the teacher can select themes that are in his/her opinion relevant, avoid others not considered as important, and connect them in different ways, creating different stories out of a content that is prescribed within the curriculum. The autonomy that makes this possible is narrowly linked to the pedagogical orientations that promote problem solving-based strategies, goal-based planning of the educational process, and, in the last decade, competency-based education. These strategies basically differ from content-based education and allow constructions of knowledge that are intended for a target group of students with specifically defined needs and interests.

This new culture shifts the center of the educational process from a frontward relation between teachers and students to an individual response and engagement from these last to a community that is continually creating and recreating knowledge.

In a transmedia globally connected world in which it is possible to use different platforms to connect and communicate, learners and teachers are not attached to a specific space anymore. It is in fact a global, multicultural community that eventually uses many verbal languages and scripts. In these contexts, visual language becomes universal that is widely understood and at the same time carries the particular touch of cultural peculiarities [33].

We could infer that in these cases, individual creativity is not a final goal anymore because of the shift from exclusively individual expression to a collective upgrade of the results achieved during the interchange process that is fostered by transmedia. It is a kind of collective creativity that shares students' various experiences, viewpoints, interpretations of meanings, skills, and abilities that usually engage, motivate, and catch individual students' attention because each one of them recognizes his/her responsibility in the construction of the entire process [34].

As a pedagogical tool, transmedia narratives allow critical thinking, as it is necessary to identify relevant or interesting information and materials to be able to engage in the process of construction of knowledge. At this stage the teachers may act only as a facilitator because the students are the actual actors in this student-centered learning process.

Another characteristic of this strategy is that it does not go for a linear process as in traditional pedagogical approaches. Individuals should create parallel stories that eventually deal with contents in a complementary way. The point at which they meet to create a narrative that fulfills the learning goals as a whole is not easy to predict. And the reactions it can produce and the actual characteristics of the final products are unpredictable. Being centered in students' response, transmedia storytelling in pedagogical uses is a wide and deep process. Of course, we cannot foresee how deeply it will come in the end. Maybe, this is the most obvious feature of its use in the world of education. If it was not used in this way, all the potentials of these strategies would be abridged.

5. Transmedia narratives in an art education: project-based methodology

Everyday life in a school environment offers many interesting challenges. A generational gap between many teachers and students is becoming deeper; many older teachers still have little experience with social digital media and are negative

toward its use as didactic media. Simply being able to handle the technical area is not enough; teachers should be primarily experts in the semiotic and sensory levels. Not all of them have experience in this field. On the other hand, computing is included in school programs at an early stage. Students make wide use of computers because schools are highly provisioned with technology. They also make wide use of digital social media because interacting and communicating through them are part of their lifestyle. Media reshapes their visions of the world.

Students are a group of individuals with different experiences, abilities, interests, and affinities. Each one can construct the meaning of the acquired knowledge in his/her own way and in accordance with his/her own experience. Such an approach, which supports the links of various contents in order to establish the transfer of thought strategies, necessarily takes into account individual interests and abilities of an individual. The need for an increasing individualism of the learning process requires that the teacher always keeps in mind the individual and the group, which dictates the creation of flexible, alternative, and very dynamic teaching strategies. The implementation of cross-curricular links therefore largely depends on the initiative, the professional engagement, and the autonomy of the teacher.

On the other side, individual students make use of social media to share their experiences, ideas, and interests, creating communities where people with similar interests meet to expand the horizon of individual achievements. This is a consideration of chief importance when planning to use these platforms in the pedagogical process, and teachers who are aware of this can make interesting improvements in the way they approach planning the pedagogic process.

The acquisition of knowledge through an experience that does not present any boundaries or limitations regarding learning contents is essential. Nowadays students have very different backgrounds, and many teachers today are confronted with the fact that students possess many information mostly gathered and facilitated in digital media and the Internet. Many times these information exceed the contents required within curricula. Curricular changes develop at a significantly slower rate than students' acquisition of knowledge and experiences. Probably this is the main gap in our school programs and one of the key difficulties teachers face planning their teaching processes.

At this place, it is necessary to add that taking into account that our project was launched within art education, some considerations about the aesthetic competences students should achieve in this field must be made.

There is a big difference between capturing daily life in a random way and actually using visuals to communicate telling mostly visual stories. The capture of visually interesting content is at the foundation of visual storytelling. Today everyone is taking pictures, shooting video, and sharing it. The proliferation of devices is a major challenge faced by the student within art education. But while technology has spread the camera far and wide, giving it vast new powers, it is not the key to taking viewers to that next level of seeing. The ability to see and evaluate images with a well-educated eye is vital [35]. And this is of key importance in the art education teaching and learning process; it is one of its main goals.

### 5.1 Project-based methodology and transmedia narratives

In order to verify how transmedia narratives work in the context of a cross-curricular or interdisciplinary teaching-learning process, we developed a pedagogical approach using project-based methodology. It employed transmedia narratives in the field of art education, stressing on the potentials of multisensory emotional arousal that increases the likelihood of memory consolidation, the process of creating a permanent record of the encoded information, and allows for different

interpretations, negotiation, and meaning-making of them. This enabled us to understand the impacts these activities may have on students and to recognize the possible positive and negative characteristics of this approach to be able to consider them in future projects.

Our research was carried out during the 2018/2019 school year. It included 15- and 16-year-old high school students, three teachers from the fields of art history and theory, biology, and mathematics, and the researcher that proposed the realization of the project. Art education was the core subject, but goals and contents prescribed by the other subjects included in the activities had to be achieved. This is an important requirement in interdisciplinary projects.

At the beginning all teachers were presented with the characteristics of the project, focusing on the meaning of transmedia activities and their potential benefits because they had no experience in such field. A detailed plan of activities was issued together within which each teacher explained his/her expectations and the exact results he/she should find achieved at the end of the project.

We decided to launch the project including three basic phases that considered key activities. The first phase included the formation of working groups among students, presentation of the basic contents by the teachers, and the realization of a motivational and introductory artwork; it also included individual gathering of information, elaboration, and presentation using multimedia to the rest of the participants in each group (**Figure 1**). The second phase was meant for the students' interchange in social media, creating a story out of all the collected information within the groups. The third included interchange and connection of different viewpoint stories, which should lead to a new original and wider story, which could
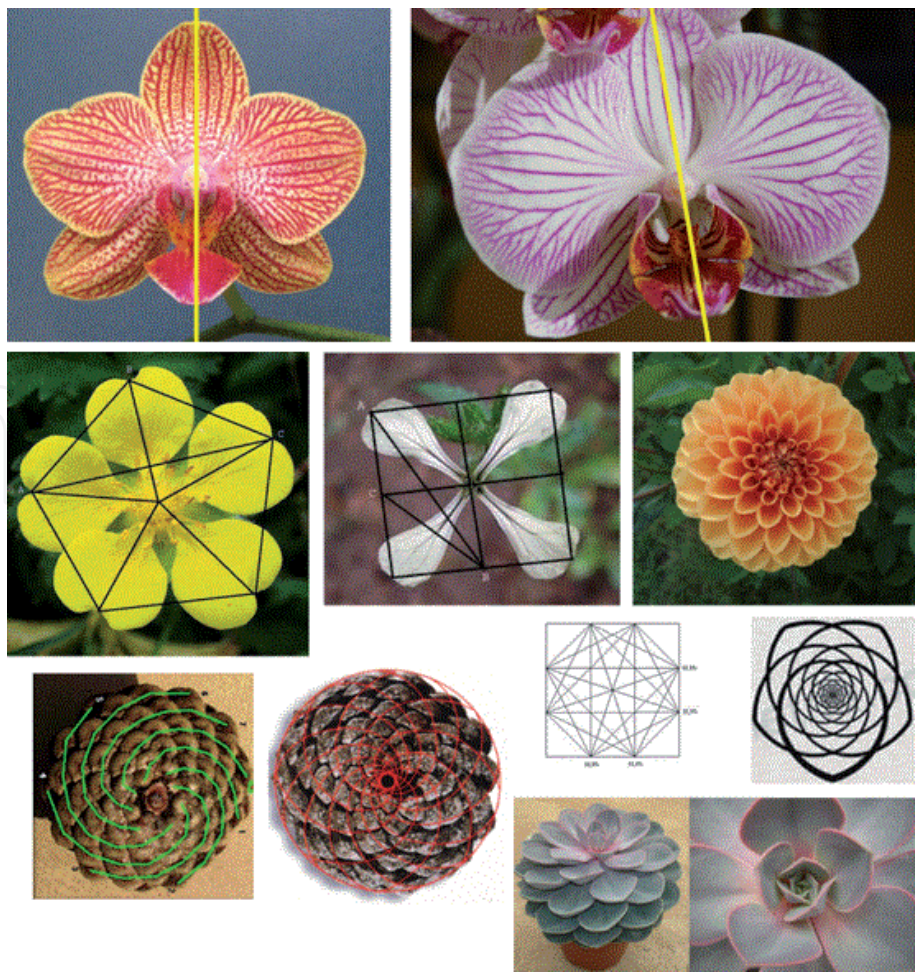
Figure 1.
Material collected in the biology and mathematics groups.

be accessed by all the participating students. At the end of this phase, students from each group had to propose an activity within art education intended for the students that participated in the rest of the groups. This was the point of conclusion of students' activities and was meant to practically use and consolidate the supposedly acquired knowledge. The last part of the project included a meeting of all the participants, where students presented the development of their work during the different phases. This was the main material that was evaluated by the teachers. In this way we could have a picture of the process within the three groups of students, compare the results, and draw conclusions.

Upon completion of the course using transmedia storytelling with cross-curricular integration between different contents from fine arts, biology, and mathematics, the students answered short survey questions. With the questionnaire we wanted to find out their opinion on the approach used.

One of the main goals of the project was to verify to which extent students would go deep in their acquisition of knowledge through an experience that did not present any boundaries or limitations regarding learning contents. Another goal was to detect how students would take advantage of the proposal to use different distribution channels during their learning process.

As stated before, students worked in three groups of five or six participants each, regarding the fields of study. The groups were formed by participants with different learning styles and ways of reaction and behavior when having to solve problems. Diverger and theorist students were fluent in collecting and sorting material; pragmatists in linking contents, forming an empirical understanding of the problem, and looking for the useful aspects of learning and solving the task; and activists concrete at the moment of concluding it and giving it a final form. This assured a wide range of approaches to the given task and enhanced the actual experience of teamwork where each individual contributes to the result from his/her own viewpoint and specific manner.

Each group could choose a concrete field of research, art history and theory, biology, or mathematics, to ensure the interdisciplinarity of their approach, the relations between art and nature being the general theme of the lessons. Students could pick out the aspect of the problem they wished to develop through their works.

Students that engaged in the field of art history and theory were presented the work of artists that dealt with nature in different ways in the motifs of their artworks as Caravaggio's still lifes; Arcimboldo's portraits made entirely of objects such as fruits, vegetables, flowers, or fish; Cezanne's still lifes and landscapes; Ernst's frontages to reveal the imprints of the materials from the natural world placed beneath the canvas; or O'Keeffe's depictions of flowers. This was just an introductory presentation to give them an idea of the possible paths of research they could follow in the process of their work. Students could also explore other examples to enlighten questions about the composition of the artworks.

Students that chose the field of biology were presented the physical structure, physiological mechanisms, development, and evolution of living organisms as plants and animals. Students could explore examples to enlighten questions about the diversity of structures in the natural world.

Students engaged in the field of mathematics were presented contents about measurements and the systematic study of shapes of physical objects, emphasizing on the notion of symmetry and proportions, particularly the golden ratio.

Within the three groups students were given an introduction exercise to ground the approach to the contents they were asked to use during their activities. Because the main field of study was art education, all students were asked to create an artwork choosing the aspect of the problem they were interested in from the point of view of the three different subjects.

Then followed the group work. Each group worked independently, not knowing about the themes of the others. This approach was merely intuitive as these works only functioned as a motivation key that should lead to a deeper and concrete research of the contents.

The students were not given any particular instructions about the organization of work within each group. All of them used the World Wide Net to collect information and used social media, Facebook and Twitter, to communicate ideas among them. During the analysis of the results, after the completion of the project, they all reported that closed groups were created, where each of them could upload any contents.

Students were then asked to make photo albums, drawings, and presentations out of the gathered material. The photo albums had to construct logic stories, with a structured clear development of their narrations. They also had to include multisensory addressing to different senses.

The students of the art history and theory group analyzed examples of artworks that dealt with nature in different ways in the motifs; many of them produced their own works, scanned or made photos, and posted them, adding notes that helped to construct their individual stories.

Students that chose the field of biology analyzed the physical structure of many animals and plants. Students explored examples to enlighten questions about the diversity of structures in the natural world. Because the project was launched in art education, they focused their attention on composition, symmetry, and the relation between the whole and its parts.

Students engaged in the field of mathematics engaged in the analysis of different shapes and volumes of physical objects, emphasizing on the notion of symmetry and proportions as the golden ratio.

At the second phase, students had to elaborate the information. Aspects of creativity like sensibility in discovering problems and understanding aesthetic structures, imagination in the redefinition of the role and value of elements, aesthetic elaboration and planning of ideas and solutions, fluency of ideas, and flexibility in the arrangement of the means of expression were of particular importance (**Figure 2**).

Students from each group did not know anything about the work of the others. This was an important condition of the work, as we did not want any group to be influenced by the material gathered by the rest. It is important to stress on the fact that the contents were new for all the students.
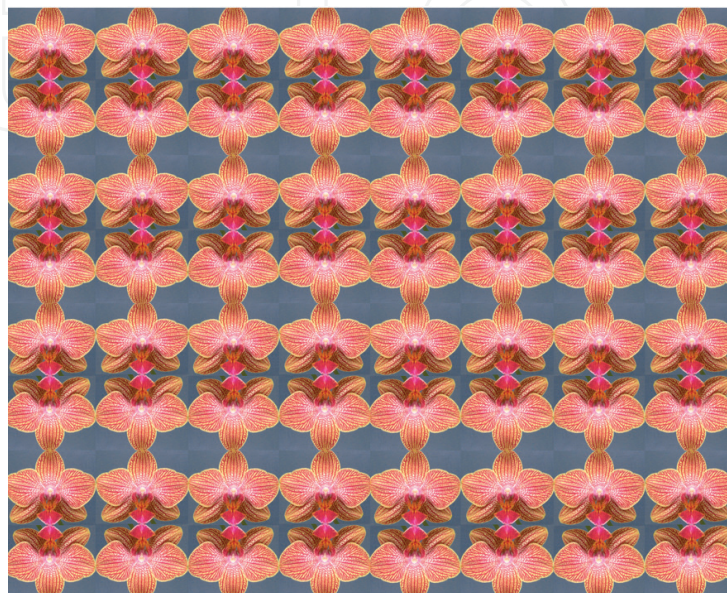
Figure 2.
*One of the final artworks based on biology and math.*

Figure 3.
Picasso's Bull's Head.

At this point of the project, when all the information in the three groups was put together, all the participating students were allowed as members of the groups created in social media. The most interesting for them was Facebook because of the possibility to create albums of photos in an easy way, copy, and reuse them in new contexts and with the digital tools they were competent to use.

The visual stories students created linking the information required elaboration and planning of ideas and solutions, and originality, which meant unusual
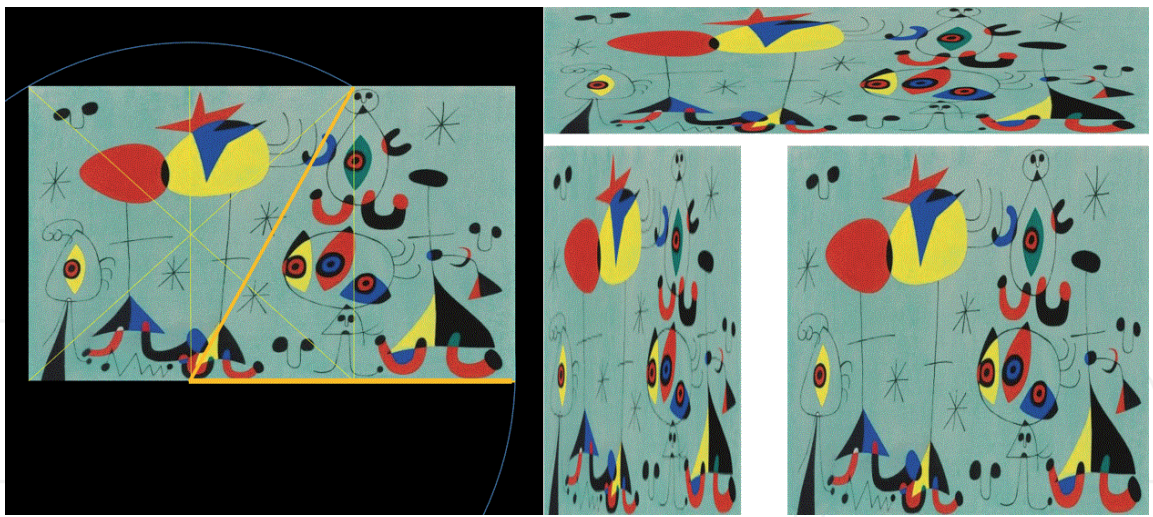
Figure 4.
One of the works done by the group art history and theory, analyzing and reshaping Miro.
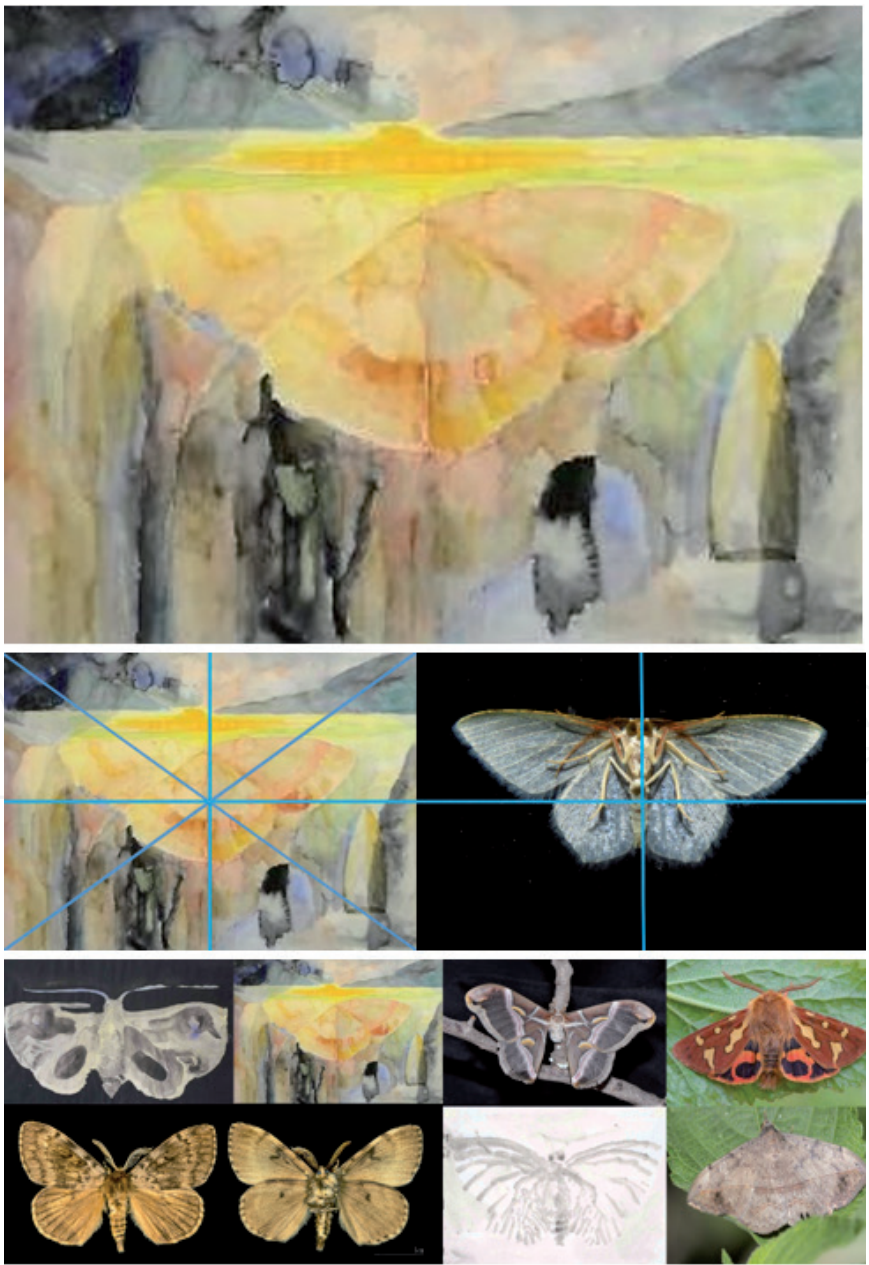
Figure 5.
Materials collected by the art and theory group gathering information about the work of Brumen Čop.
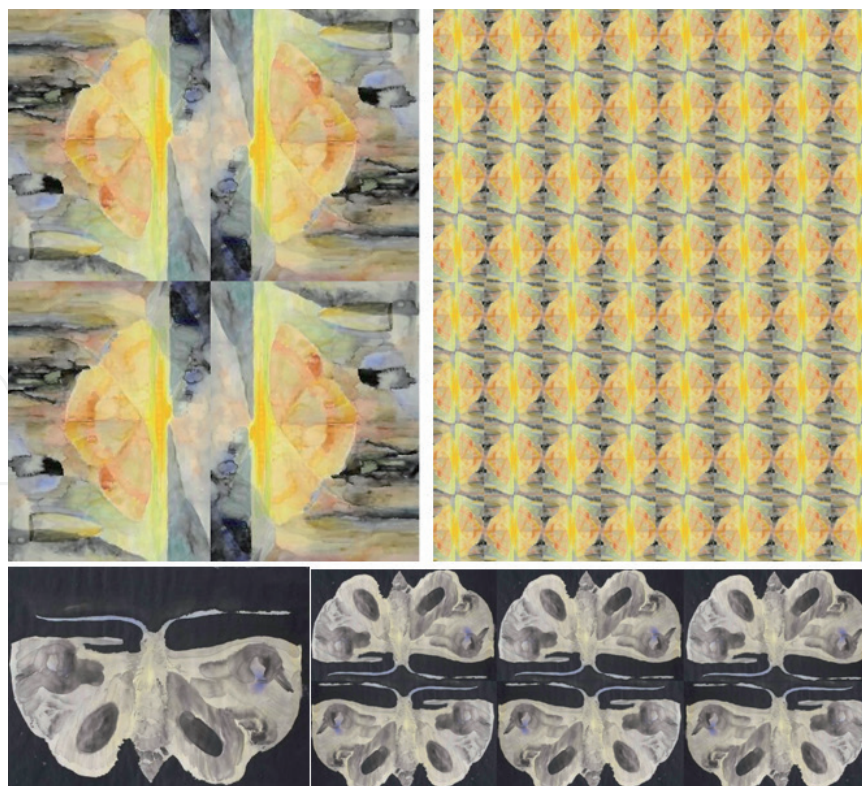
Figure 6.
Reshaping Brumen Čop.

strategies when solving the problem of presentation of the results using multimedia. Interchange in social media, creating a story out of the collected information, from different viewpoints was a part of the challenge. The short and essential story of understanding the meanings and scope of the contents should lead to a new original and wider story. In the end, they had to upload their works in a new created group and create an activity or task to consolidate the knowledge gained as a final exercise.

In one group, students made white/black copies of the patterns they created using different kinds of symmetries in orchids which were offered to the others to be colored in variations of color combinations. Another group found interesting Picasso's Bull's Head and compared it to the image of a real animal (**Figure 3**). They proposed to write an essay entitled "What would Picasso have done with my bike?". They wrote the first paragraph and asked the rest to complete the story. A third group worked with surrealist Miro's painting Snob Evening at the princess, and after verifying it was done on a golden ratio format, they proposed to have a look at what it would have looked like if it was not (**Figure 4**). Similar operations were made on the basis of the collection of paintings entitled Moths by the Slovenian painter Andrej Brumen Čop (**Figure 5**). The images of the chosen art works were reshaped in order to create new artworks based on the knowledge and experiences gained in biology and math. Each group picked a different kind of narrative to present the results of their work and to engage the rest in the creation of a new story. This last part was relevant to gain interest and attention and arouse the emotional engagement of students when finding unexpected answers to the proposed tasks (**Figure 6**).

6. Discussion

Upon completion of the course using transmedia storytelling with cross-curricular integration, the students answered short survey questions. With the questionnaire we wanted to find out their opinion on the approach used.

The students praised the gradual integration of the introduction of an individual strategy for solving tasks and the individual choice of fine art examples and artistic motifs. They expressed the opinion that they were mostly motivated by the surprise of the unexpected connections between the contents and the perspective toward the different subjects from the point of view of the general artistic, aesthetic experience. They were also motivated by the use of known concepts and contents in different and new contexts.

Art students are in general reluctant to natural sciences and mathematics. For some, they are not easy to understand, and their performance in these areas of study is not as good as in other subjects. They are thus less motivated and a priori think they will not be successful when given tasks from these fields. In this case, many students stressed on the fact that linking contents based on art and through their main ability which is focused on visuals was encouraging and opened a new perspective on how to look at natural phenomena. In this way they reached higher levels of cognitive functioning, understanding, and use of analysis and synthesis than when they were taught in the classic way. They needed the opportunity to compose and communicate, replicate, and challenge the stories told about their work through different media. In this way we can assure that social media should foster inclusive approaches for all types of students, performing personal and public expression and connection [36].

The responses of the students showed a strong sympathy for the approach used, mainly because of the possibility that each person can create his/her own positions and in his/her own way, suggesting solutions for artistic tasks and expressing the interests, wishes, and expectations and performing in their own way. That was mainly because each one felt that diversity is a possible and positive value.

This method does not primarily demand hand skills but, instead, a high degree of accuracy when designing the goals of every operation as well as regarding the final products. The designer-student and the teacher as well had the important task of critical evaluation: deciding between a wide range of possibilities and the necessity to choose the right and most appropriate variant. Being able to be critical implied skills demonstrated in different fields.

Transmedia narrative is quite a complex strategy in the context of a pedagogical process. On one side it offers a wide range of possibilities based on the everyday experiences students have in social media. In this case they mostly used Facebook and video conferences. These allowed them to contact in distance and be able to meet in virtual space at any time. The fact that they created closed groups without the presence and control of the teacher was also something they liked. They could freely express their ideas and manage the information and ideas they produced without feeling they were evaluated at all steps of their work. What mattered were the final story and the possibility to construct it in the way each group desired. They could be critical and make changes as it was a kind of work in progress. They very much appreciated the fact that their stories did not end in a multimedia presentation but they had to upgrade this step offering their mates the possibility to conclude them in different ways and using various channels to share the results. For some students that do not use social media so often or are reluctant to their use, because they feel they are constantly exposed to unexpected reactions, the task was not so easy. Creating close groups in which they felt comfortable and safe made them more confident, and in the end they were amazed by the different paths to which their works led. This combination of individual and communitarian was a great experience for them because it showed them how they could enrich their visions about the contents and the ways in which they could follow a satisfactory process, enabling them to learn more and in more appropriate ways.

The transmedia narrative learning process gradually included the possibility of introducing an individual strategy for solving the proposed task, the use of new concepts, and contents in different contexts, which certainly played an important role in the successful completion of the work. In this case, the surprise in the unexpected links between the content has also played an important role in students' motivation. Motivation opened the possibility of accomplished attention. On this basis, students could point on the contents in the ways they believed would be the most efficient. Emotional arousal was actually a particular state associated with their thoughts, feelings, behavioral responses, and positive or negative experiences, linked to their particular learning styles. Cognition, especially from the point of view of the interpretation of events or data, is an important aspect of emotion, and this is essential in the process of learning. This could be verified at all stages of the learning process.

Undoubtedly, such instruction is a special way of organization; it requires a lot of flexibility in planning and evaluating the results of the work. Our own ideas about what we expect from the learning process should also be adapted. Dialectics among successive experiences that involve teachers with their own experience, professionalism, organizational skills, knowledge, and intuition for individual leadership and the student who interprets and builds a picture of the world are derived from the way each one accepts the world and assembles elements into a new whole with meaning in a particular, renewed context each time.

It is also necessary to consider the conditions under which we can ensure the success of using such an approach to work: an atmosphere that motivates and facilitates the expression of opinions and feelings, appropriate preparation of the physical environment in which the activity takes place and didactic material, and a combination of different forms of work, by providing temporary privacy and at the same time diversity of expressed ideas. Finally, the readiness of the manager of the activity is extremely important, which is supposed to be known to him/her both theoretically and practically, from his/her own experience.

We can conclude that it is in fact of little consequence if we plan to connect different subjects in a unidirectional way: the motivation for the artistic activity is greater if the subjects of the learning process have the possibility of generating their own learning strategies, while linking the visual content with others, which are essentially a source of internal motivation. This statement was confirmed by the students themselves in answering questions on motivation and in valuing art products at the end of the artwork. The presented work strategy requires the teacher to have a good knowledge of the content of related subjects and sincerely believe in the possibility of an integrated view of them. Cross-curricular integration is therefore a challenge and an opportunity for internal motivation of the teacher at work and professional and personal growth.

During the discussion, teachers admitted that they had to adapt to this model of teaching and learning in a space which did not offer them the safety of the classroom where they can monitor and assess all the activities of the students. As stated before, the final evaluation of the achievements accomplished by the students demanded a specific approach that was in fact new for them.

7. Conclusion

Many school programs are still organized following a schema in which different subjects are watertight compartments, entirely separated from the rest of the structure of which they are part. Many times the key reason for the loose of students' motivation is precisely the abovementioned consideration of contents,

isolated from authentic contexts and not linked to the interests and expectations of students. The need for individualization of the educational process demands creating flexible, alternative, and dynamic teaching and learning strategies. Creating transmedia narratives is reliably one of these.

Experience is not a mere perception from the outside world. A dialectic view presupposes that experience is formed on the basis of exchanges between sensory perception and reflection. A perceptive experience becomes an experience only through an interpretative process. Some life experiences, e.g., an aesthetic experience, can transform a person if he/she recognizes a particular type of experience in it. This was another fact acknowledged within the presented project.

"The aesthetic experience differs from general experience because it is holistic and unique in nature and includes the whole human personality" [37]. "The aesthetic moment is one of the basic moments of human experience and artistic expression is one of the basic ways to beautify and enrich life. Every perception of aesthetic rather than epistemological nature is more cooperative than passive, and encourages man to the kind of possibilities offered by the environment. Aesthetic experience implies an enriching notion of democracy, communication, education, a nearly religious experience. In the work of Art as an Experience [38], Dewey says that "the task of aesthetics is to reintroduce continuity between pretentious and powerful forms of experience, such as works of art and everyday events. There must be a continuity between art and every day, ultimately also universal events of life" [39]. Therefore, the current aesthetic experience dictates the dynamics, which is characteristic of all artistic forms.

The multisensory orientation of transmedia narratives as pedagogic strategies is congruent with contemporary trends in arts, which permit art educators to facilitate the aesthetic imagination necessary to engage in and to participate within contemporary arts and cultural experiences as well as appreciate and understand the history of arts and culture in a much more holistic way [40].

The presented work strategy actively involves participants in the learning process, which increases motivation, personal engagement, and open contradictions between their own and others' experiences and between goals and processes. It helps to change consolidated positions, extends the perspective of looking at certain phenomena, and helps to connect in other conditions' separated aspects, cognition, emotion, and action. We could say that it realizes Dewey's thoughts that when we look, we could add or create an artwork, an emotion, and a thinking that work together in their perceptible and sensual connection, so experience is the complex in which the world opens and gives us meanings and values also in a nonverbal way.

The sensorial experiences of sight, hearing, touch, and their combinations are limited in virtual space [41]. In fact, the evolution of media technology tends to present things as realistic as possible; however, physical interaction is not possible, as well as the inclusion of nonverbal signs like body language or the real context of the sensorial experience. "New technologies are constructing a particular kind of viewer that is screen based" [42]. This definition can also be extended, at least to a certain extent, to contemporary students.

Art education in the twenty-first century faces contradictory challenges. On the one hand, it is necessary to improve experiences using all the possibilities offered by new media; they facilitate spatial visualization and many operations that are practically impossible to undertake without the use of them. On the other hand, it is obvious that a global sight on the pedagogical process of art education demands the inclusion of a new, specific way of accurate evaluation of three-dimensional haptic activities that would enable students to experience the actual characteristics of materials, which are neglected by screen media. In fact, the understanding of past as well as contemporary art products demands a set of complex and rich

experiences, which is one of the principle objectives of education at all levels. Transmedia narratives, because of the potential use of different distribution channels that are in fact not necessarily connected with screen media, offer a wide range of possibilities tying the real and the virtual in specific modes.

The barriers that once separated the different fields of art no longer exist. New technologies brought an entirely new range of experiences and possibilities. The dynamics of sociocultural changes affect artistic expression; debates about the cultural identity of minority groups, issues of national identity and gender, development of technological means, and the postmodern philosophy of fragmentation and plurality reshaped assumptions about education. These transformations affect the way we approach and learn about art. The traditional dimensions of learning are still present in our expectations and practices, but at the same time, we search for alternative concepts. Old paradigms based on technical skills, which prevailed when the subject found its way in school programs two centuries ago, encyclopedic knowledge, or mere self-expression are not responding to the demands of the society anymore. Sensorial images are present all around us, and we must respond to them, making decisions that involve creativity, originality, spatial visualization, motivation, and imagination.

To give art education its proper place in general education, it should embrace far-reaching holistic forms and practices that can be critically examined through interdisciplinary, multidisciplinary, and transdisciplinary methods associated with contemporary educational strategies as transmedia narratives are.

The aesthetic dimension is a unique process of cognition that can be developed by art education in the school context.

The meaning of the presented research can be seen in a broad context: major changes in the perception and evaluation of events in the art world, which occur parallel to relevant changes in the school environment, rapid functional changes in the lives of today's students, and the responsibility of teachers as managers within the reproductive machine that school necessary still is in the system of the ideological apparatus that rules our present world.

Acknowledgements

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