Winter, Her Dolphin Tale, and the Rise of Environmental Education

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Abstract

Dolphin Tale is a movie about a dolphin that loses its tail after being entangled in a crab trap line and obtains a prosthetic tail. The movie was presented to support environmental education classes at the University of Brasilia. Over a period of five years, 210 Brazilian undergraduate and graduate students answered questionnaires after watching it. The results demonstrate that the movie helped to accomplish environmental education goals: the comprehension of the role of scientific knowledge in solving socio-environmental problems, the impact of human activities on biodiversity, the novelty of the integrative interplay of different disciplines, and the importance of values in awareness.

Keywords: interdisciplinarity; values; biodiversity conservation; environmental impact; movie

Introduction

Winter is a female Atlantic bottlenose dolphin (*Tursiops truncatus*) that became entangled in a crab trap line and was rescued through a joint effort of the Harbor Branch Institute, Hubbs-SeaWorld Research Institute and Clearwater Marine Aquarium on December 10, 2005. She got her name from the marine aquarium after being welcomed into her new home.

Due to the severity of her injury, she lost her tail despite efforts to promote healing. However, this tailless dolphin adapted to the situation by developing an unusual swimming technique of moving her body from side to side instead of up and down.

Her caretakers in the aquarium were worried that this new swimming mode would cause permanent injury to her spine. Kevin Carroll, a prosthetist who heard the broadcast about this concern, decided to work with his team on the development of a prosthetic dolphin tail (Anthes, 2013). Their effort led to the production of a plastic tail that could slip over the remaining peduncle and an innovative thermoplastic elastomer capable of cushioning Winter's stump and protecting her skin, withstanding daily use in saltwater. The success of this new material has also helped human amputees.

Winter's personal saga was adapted into a movie by Warner Brothers in 2011 (*Dolphin Tale*), with some romanticization, such as the presence of a boy named Sawyer to create a man-dolphin emotional attachment.

The aim of this article is to analyze the results of five years of data collection on how undergraduate and graduate students saw Winter's story through a film adaptation and, consequently, what can be learned from the data in terms of environmental education.

Theoretical framework

It was proposed that a story about an injured dolphin could help to develop awareness of socio-environmental impacts, given that movies capture attention and thereby help students acquire information and recall concepts (Kavan & Burne, 2009). Information provided by movies and documentaries can provide influence on attitudes toward the environment (Alyaz et al., 2017).

Beyond the informational element, the emotional dimensions of the movies can meet educational purposes, and life stories in particular have been a powerful resource in teaching (Blasco et al., 2015).

This emotional attachment can be decisive in helping students develop emotional nature relatedness — appreciation for, and understanding of, our interconnectedness with all other living things on the planet, and thus provide a motivational force toward nature protection (Nisbet et al., 2009). Life stories can help promote environmental concern as they utilize stories that can elicit emotional responses in an educational context (Steele & Scott, 2016). Although emotion alone is not enough to understand the world, it often provides a critical way to the rational process of learning, given that emotions come before rational thinking (Blasco et al., 2015).

According to this perspective, educating through emotion doesn't mean that learning is limited to values and attitudes, focused on the affective domain. Rather, it means the development of a whole collective consciousness, integrating affective and rational domains with a new rationality: a new ecocentric knowledge (Saito et al., 2018). This ecocentric consciousness represents the emergence of a transcendent conscious being, capable of feeling and seeing one's self in some sense participating in nature (Sheldrake, 2009).

Forestell (1993) has defended the idea that the emotional, direct experience of contact with the observation of nature would allow the development of a practical and intuitive understanding beyond the cognitive or intellectual one. In this case, life story movies can mobilize these emotional experiences that are grounded in evocative imagery, sound, and emotional story lines.

The movie learning scenario can help teachers to address specific scenes for teaching purposes and call out students' memories and feelings. Such environmental education, supported by language arts and technologies, can encourage students to

reevaluate their own beliefs, think in a different and unexpected perspective, and question conventional thinking or the ordinary way-of-life (Toledo et al., 2014).

To reevaluate their own beliefs, it is necessary to make students aware of their emotional responses, stimulating them to express their meta-emotions, which are evaluative thoughts and feelings about emotions that movies elicit from viewers (Bartsch, 2008). For example, in a different educational context without movies, but with students' exposure to a real story about the massive killing of cats on the University campus, the inquiry for words representing meta-emotions and prejudices about cats were useful to understand the cultural justification of this massive killing and the prediction of the possibility of its future repetition (Saito et al., 2002).

Meta-emotions are accompanied by values that can be addressed in an educational context emphasizing relationships, relationships among all the systems on Earth and the way living beings are inserted into this system (Lewis et al., 2008). Values concerning relationships among all the systems on Earth are important to environmental education, because they can show if nature is respected or exploited by human society in the Anthropocene perhaps following a perverse Baconian delusion of human's right of domination over nature, which persists over time and education, even among scientists (Saito et al., 2011).

Methods

From 2015 to 2019, the *Dolphin Tale* movie was presented to undergraduate and graduate students at the University of Brasilia during environmental education courses. For the undergraduates this course is accepted for any career path, although it was originally created as part of Biological Sciences curriculum. For the graduates it was a course of the Sustainable Development graduate program. Both undergraduate and graduate courses have 60 hours duration in total.

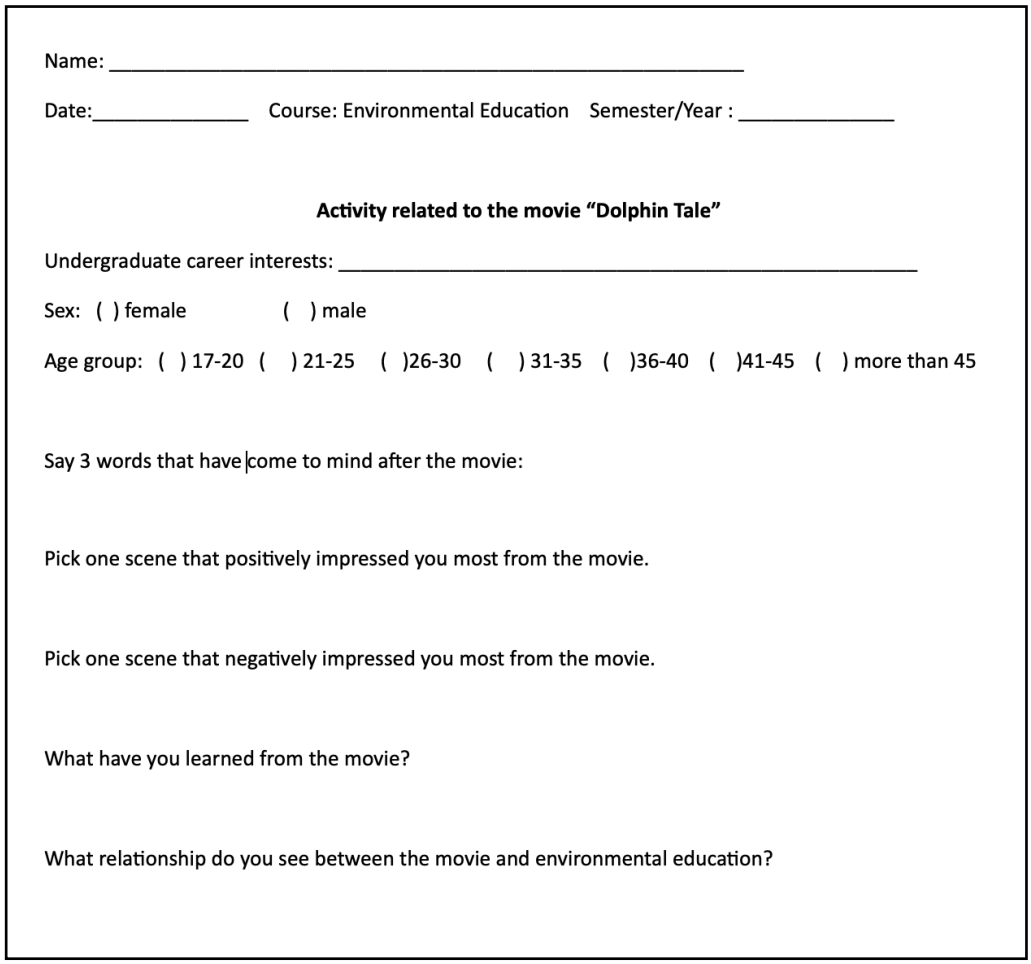
The movie was presented during the introductory block of the course, to present ideas of human nature interactions, conflicts and possible actions aiming to protect biodiversity, ecosystem services and to understand the scope of environmental education. The movie was typically presented during the fourth meeting, after reading and discussing the main principles and objectives of environmental education described in international conferences, such as the 1975 Belgrade International Workshop on Environmental Education and the 1977 Tbilisi Intergovernmental Conference on Environmental Education.

After watching the movie, the students were asked to answer some questions aiming to identify connections with environmental education (Figure 1). To avoid having students provide only positive answers that they may have assumed were expected, they were invited to complete the questionnaire solely for a participation bonus that had no relationship to the content of their answers. Additionally, to avoid any influence by the teacher on how the students interpreted the movie or what they wrote about for the questionnaire answers, all comments and background information about

the story and the movie production were discussed only after the students' answers were submitted.

Figure 1

Example of questionnaire structure



Name: _____

Date:_____ Course: Environmental Education Semester/Year : _____

Activity related to the movie "Dolphin Tale"

Undergraduate career interests: _____

Sex: ( ) female ( ) male

Age group: ( ) 17-20 ( ) 21-25 ( )26-30 ( ) 31-35 ( )36-40 ( )41-45 ( ) more than 45

Say 3 words that have come to mind after the movie:

Pick one scene that positively impressed you most from the movie.

Pick one scene that negatively impressed you most from the movie.

What have you learned from the movie?

What relationship do you see between the movie and environmental education?

The central question asked for the students to write three words that immediately came to mind, trying to register the students' primary feelings without they having much time to think. This question is the main focus of the present research and was used in search of meta-emotions (Bartsch, 2008,) given that movies have the power to generate attitudes and emotions (Oliveira et al., 2013).

To help understand the three words, the other questions aimed to identify the scenes that caused positive and negative impressions, the lessons the students learned for their own lives, and the linkages with environmental education. These other questions are secondary data, and they were used to support discussion and interpretation of the three spontaneous words they presented.

Only after collecting the students' questionnaires, discussions were opened in the classroom to reinforce impressions and clarify issues and connections with environmental education. The answers were quickly and immediately analyzed by the professor who facilitated discussions. To analyze student choice of spontaneous words, their answers on the other parts of the questionnaire were considered as well.

For the three spontaneous word data collection, after conducting a spell check and sorting all the words, a first categorization process supported by content analysis was performed (Bardin, 1977) to group similar words within the same key concepts. Three steps were followed during this process of word grouping: 1) identifying singular and plural versions of the same word; 2) grouping the same word root; and c) analyzing words that expressed similar ideas. A word frequency score was produced after this first categorization process. The most frequent key concept words revealed how Winter's story affected the students.

Additionally, a second categorization procedure was performed: the words resulting from the first categorization were grouped under an umbrella term describing a group of varying but identifiably related subjects. This second categorization was performed independently of the frequency and word ranking, with the resulting umbrella terms representing a set of interrelated ideas that can be correlated to environmental education principles. The main objective of this step is to promote higher scale reasoning from students' spontaneously chosen words, while respecting their personal attachments to memories and values elicited by the movie.

Results

A total of 210 students (135 were female) participated in the activity, from 2015 to 2019. The respondents were largely young people (55 respondents were aged 17 to 20, and 122 respondents were aged 21 to 25). Twelve respondents were over the age of 40 (Table 1). The majority of these students were undergraduate students (190) with different career interests (biology, chemistry, forest engineering, geography, environmental sciences, tourism, museology, psychology, social sciences, financial accounting, communication, and others); only 20 of them were graduate students in the graduate program in sustainable development (2015 and 2016).

These students indicated 629 words in total that immediately came to mind (2.99 words per student). After exactly matching words were excluded, we found 189 different words, which were grouped into 47 words representing different core ideas. This reduction was a result of the categorization process (Bardin, 1977), which grouped some different words under the same unique word. Three types of grouping processes were performed: a1) singular and plural versions of the same word (e.g., "possibility" and "possibilities"); 2) root words derived as both nouns and adjectives (e.g., "friendship" and "friend") or as both nouns and verbs (e.g., "adaptation" and "to adapt" [himself]); and 3) words that expressed similar ideas ("believe/faith", "persistence/ perseverance/to insist/warrior", "care/zeal/concern", "will/determination/effort", "tenderness/touching/empathy/compassion/sympathy/affection", among others).

Table 1

Students age profile per year.

Age / Year	2015	2016	2017	2018	2019	Total
17-20	22	2	13	12	6	55
21-25	27	15	31	32	17	122
26-30	7	1	2	2	0	12
31-35	2	3	1	1	0	7
36-40	0	2	0	0	0	2
41-45	1	1	0	0	0	2
more than 45	4	3	2	1	0	10
Total	63	27	49	48	23	210

The list of the main words (with a minimal global frequency of two digits) resultant of the first categorization is presented in Table 2, which also informs the main word frequency in each year separately. From this list, a word cloud figure was edited (Figure 2).

Figure 2

Word cloud resulting from the words frequency.

Table 2

Word frequency compilation resulting from the demand to express the first 3 ideas that arose from the Dolphin Tale movie.

	Words frequency						
		Word ranking					
words	Global frequency	Global ranking	2015	2016	2017	2018	2019
Overcoming	86	1	1	1	1	1	1
Perseverance	60	2	1	2	4	3	5
Tenderness	42	3	7	5	4	2	14
Care	36	4	5	3	9	6	7
Inspiration	35	5	3	12	13	4	2
Will	32	6	10	5	8	6	10
Friendship	31	7	13	4	2	13	8
Love	30	8	3	5	9	6	14
Rehabilitation	28	9	10	5	17	5	4
Sustainability	27	10	15	5	7	9	5
Cooperation	25	11	6		6	9	
Prosthetic_tail	23	12	7	10	13	14	2
Solidarity	23	12	13	24	3	11	
Hope	22	14	10	10	9	11	10
Creativity	21	15	28	12	13	14	
Awareness	20	16	19		17		10
Dolphin	17	17	7		9	22	8
Family	11	18	16		13	14	10
Others (miscellaneous group)	60						
Words Total	629		190	81	144	145	69

The top word is “overcoming”, and it is remarkable that this top word was the top word of each year. The global top five words, in general, were frequently in the top positions each year.

The second categorization process grouped these words in 4 umbrella terms: “resilience”, “emotion”, “environmental concern”, and “science-technology-innovation”.

Some students’ speeches were selected to support further analysis.

Discussion

The grouping process can be analyzed as the following regarding the composition of each umbrella term:

The top word, “overcoming”, can be connected with “inspiration” (the most frequent by 5%) and “hope” (14%). The second most frequent word is “perseverance”, which can be connected with “will” (6%). These words can be connected with “rehabilitation” (9%), given that together they reinforce the core message evoked in the students after seeing the movie and the first umbrella term: “*resilience”*. In ecological systems, resilience represents a measure of the persistence of systems and corresponds to the ability of an ecosystem to absorb change and disturbance and still maintain the same relationships among its populations or state variables (Holling, 1973). When this concept is transposed to human behavior, resilience is defined by the American Psychological Association as “the process and outcome of successfully adapting to difficult or challenging life experiences, especially through mental, emotional, and behavioral flexibility and adjustment to external and internal demands”[1]. Resilience then becomes important to environmental education purposes, and the association of ideas such as “overcoming” and “hope” addresses the motivation and emotional attitude to cope with envisioning the desired futures (Ojala, 2012).

The second group of ideas can connect the words “tenderness” and “care” (the most frequent by 3% and 4%, respectively) to “friendship” (7%), “love” (8%), and “family” (18%). These words and others with low frequency, such as “intimacy”, have strong emotional components, and they indicate the second umbrella term: “*emotion”*. Emotional attachment corresponds to the development of feelings of closeness and affection, and it plays an important role in human societies by sustaining meaningful relationships over time. For environmental education, emotional binding to nature is a necessary basis to develop a nature protective behavior (Marczak & Sorokowski, 2018).

The third umbrella term (“*environmental concern”*) encompasses the words “sustainability” (10%), “awareness” (16%), “solidarity” (13%), “cooperation” (11%), “dolphin” (17%), and other words with low frequency, such as “sea” and “accident”. These words embody all issues related to environmental impact, marine environment, biodiversity conservation, social participation and responsibility to protect the environment. Environmental concern and the associated idea of a world population that is aware of, and concerned about, environment protection is a core goal of the Environmental Education since The International Workshop on Environmental

Education held in Belgrade in 1975 (Saito, 2013). Once "sustainable development" and "sustainability" seemed to subsume environmental concerns (Kassas, 2002), "sustainability" was put under this umbrella term.

A fourth umbrella term ("*science-technology-innovation"*) comes from the words "prosthetic tail" (12%) and "creativity" (15%), under which all issues related to the development of science, technology and innovation, "interdisciplinarity", "multidisciplinarity", "integration", new approaches and insights to face unexpected challenges are grouped. The emergence of this last umbrella term is in accordance with the idea that both science and technology can provide solutions to the very problems they may in fact have helped to cause (UNESCO, 1978).

These four umbrella terms presented a different level of importance based on the frequency of their component words (Table 3). Clearly, "*resilience*" encompasses the most frequently mentioned spontaneous words and occupies first place in the priority ranking. In second place of importance, the umbrella term "*emotion*" represents a valid connection between "*resilience*" (the first umbrella term) and "*environmental concern*" (the third umbrella term) to offer motivation and emotional attitude for resilience, as well as the necessary attachment to nature for environmental concern. The last umbrella term ("*science-technology-innovation*") encompasses the operative conditions to put environmental concern in practice, mobilized by emotional attachment and resilient attitude. If we group all lower ranked words in Table 3 as at the 19th position, and we total the ranking numbers of the umbrella terms in that table, we obtain an overall umbrella terms ranking, from left to right, showing the lowest sum (most higher ranked words) as the most important umbrella term (37 points to "*Resilience*"), followed by "*Emotion*" (59 points), "*Environmental concern*" (86 points) and finally by "*Science-Technology-Innovation*" (103 points). The color of each column in Table 3 represents its priority ranking in range from warm color (top umbrella term) to cool one (weak umbrella term).

The set of spontaneous words and the consequent four umbrella terms demonstrate that the movie could elicit components of both the environmental and educational aspects of environmental education in the classroom: 1) recognition of the central role of integration of scientific, technological and innovative processes to promote the development of the prosthetic tail, which means the recognition of the importance of scientific knowledge and the development of technologies in solving environmental problems;2) comprehension of the role of human activities and their impact on biodiversity; 3) importance of the integrative interplay of different academic disciplines, which supports interdisciplinarity; and 4) values and the importance of individual awareness of collective action and empowerment processes. Thus, the *Dolphin Tale* can also play an informative role and make people prone to environmentally friendly attitudes, similar to the documentary films investigated by Janpol and Dilts (2016). Table 3 confirms what Kavan and Burne (2009) said about the possibility of movies to help achieve educational goals, such as learning basic concepts, understanding those concepts to develop critical thinking, confronting intriguing problems, and experiencing a sense of wonder of the world. This conclusion can be justified by the following analysis of the relationship between students' phrases and the umbrella terms (Table 3).

Table 3

The four umbrella terms and the words composing them.

Resilience	***Emotion***	***Environmental concern***	***Science-Technology-Innovation***
Overcoming (1)	Tenderness (3)	Sustainability (10)	Prosthetic_tail (12)
Perseverance (2)	Care (4)	Cooperation (11)	Creativity (15)
Inspiration (5)	Friendship (7)	Solidarity (13)	Interdisciplinarity (lower)
Will (6)	Love (8)	Awareness (16)	Multidisciplinarity (lower)
Rehabilitation (9)	Family (18)	Dolphin (17)	Integration (lower)
Hope (14)	Intimacy (lower)	Sea (lower)	Knowledge (lower)

The number indicated in parentheses represents the ranking position of the word in the word frequency. The color of each column represents its priority ranking in the range from warm color (top strong priority as umbrella term) to the cool one (weak priority as umbrella term), from left to right columns.

About "environmental concern"

The *Dolphin Tale* highlights biodiversity and its conservation as a special issue (umbrella term 3 - "*environmental concern*") encompassing emotional, scientific-ecological and ethical aspects of learning to be applied to biodiversity concerns (Kassas, 2002). The movie also adopts the proposal to include threats and actions related to contemporary human impact on conservation literacy practices (Trombulak et al., 2004; Saito, 2013). The students' answers are evidence of the capability of obtaining this literacy and commitment to biodiversity conservation: "Traps made to capture marine animals, in the case of crabs, incorrectly used or without control and correct handling, can harm other animals, such as the dolphin, that are caught by these traps" (Student-004, female, 2015); and "the scene of the hook (the scene of the X-ray), which shows a fish hook stuck deep inside the turtle's throat" (Student-071, female, 2016). Others explained what they learned: "The zeal we must have with the environment so that our actions do not affect living beings who also enjoy it" (Student-053, male, 2015); "Above all, it is necessary to make the population aware, and the message that the film sends about boats that hit animals, illegal fishing, etc., is a way of environmental education" (Student-070, female, 2016); and "The relationship I see with environmental education is the fact that the amputation of Winter's tail has to do with the traps that fishermen have left. I see that more animals were injured because of this, and the example of Winter serves to raise awareness against this practice" (Student-101, female, 2017). It is important to address the idea that the movie can facilitate the development of environmental concern because it can connect educational processes to real life, and by this way it can make people capable to face environmental problems armed by an interdisciplinary, comprehensive approach which

will permit a proper understanding of these problems, according to Recommendation n.1-7 of the Intergovernmental Conference on Environmental Education held in Tbilisi (Saito, 2013).

The analysis about anthropic threats to biodiversity was complemented by materials that bottlenose dolphins are universal in their distribution, with close contact to human activities leading to other accidents, such as entanglement in, or ingestion of, recreational fishing gear, which leads, in general, to the death of the animal (Wells & Scott, 2009). The students realized the different types of impacts that humans have on marine biodiversity, such as occasional bycatch (Snape et al., 2018) or laryngeal strangulation with a gill net (Gomerčić et al. 2009). The analysis of these different human impacts on marine biodiversity was expanded to other Brazilian environmental education issues when didactic interdisciplinary material about biodiversity conservation in Brazil (Saito, 2013) was presented and discussed in subsequent classes for both undergraduate and graduate ones.

Additionally, one student commented as follows: "These parks and zoos can have a negative bias because they take animals out of their natural habitat and leave them captive, but I could see that they can often do good things and save their lives as in the case of Winter" (Student-057, male, 2015). This type of critical reflection is important in condemning the capturing of animals for exhibitions (Curtin, 2006), but the student was also capable of recognizing the efforts of institutions committed to rescuing animals, healing them and returning them to the wild. The change of opinion due to the confrontation with different attitudes can develop critical thinking and hope, which can also help to develop environmental resilience in an Anthropocene context.

Related to this topic, a student (Student-183, male, 2018) mentioned the situation of animals in other institutions focused on animal exhibition and public entertainment. It is feasible to could be possible link ethics to human-animal relationship as part of environmental education. At this moment, some students commented about the documentary *Blackfish* concerning SeaWorld's problematic custody of Tilikum and all its other orcas (Schoen, 2016; Waller & Iluzada, 2020).

About "emotion"

Umbrella term 2 ("*emotion*") emerged because the *Dolphin Tale* awakened strong feelings of love ("tenderness" and "care" were two of the four most frequent words that came to mind), which is in accordance with the well documented connection between humans and dolphins (Curtin, 2006). One student wrote about a very positive scene: "The scene in which the dolphin pulls the boy into the water and they are playing, which shows that it is possible to have an affection/friendship between a human being and an animal" (Student-112, female, 2017). Of course, this romanticization in the movie helped students to create an emotional attachment, but it also transmitted incorrect information and false expectations. Teresa Mazza, one of Winter's real life rescuers, remarked that there was no way kids could truly swim or interact with Winter as much as the film suggested, because there were strict rules about that[2].

Regardless, emotional attachment is necessary for integrative environmental education to lead to transformative acts supported by knowledge (UNESCO, 1978). That is why Forestell (1993) and Sheldrake (1994) argued in favor of providing an intuitive and practical understanding of nature that involves emotional attachments, as well as a rational mind. Saito (2016) argued that this rational mind in integrative environmental education should encompass and combine empowerment, critical thinking, and values. According to this author, the interaction of these elements leads to an increase in awareness and promotes positive attitudes in favor of the environment, guided by ethical principles. Jayasinghe and Darner (2021) suggested that nature relatedness, conservation concern, and emotions facilitate perceptions of nature related scientific issues in more critical and sophisticated ways, influencing scientific argumentation related to biodiversity conservation.

From this perspective, a student said that, "Through the movie I could see that environmental education becomes efficient when there is a real contact between people and nature. From the moment we identify ourselves with the problem (as people have emotional identification or attachment with Winter) we are able to do incredible things to help solve that problem" (Student-141, female, 2018). Another student said: "Sensitization can be a way to change the way we look at and build positive attitudes towards the natural environment" (Student-029, female, 2015).

Blasco et al. (2015) commented that life stories and narratives enhance emotions, and therefore lay the foundation for conveying concepts, as is the case of the *Dolphin Tale*. The movie could thus draw a connection between ethics and values in the field of environmental education. One student said that the scene that most negatively impacted her was the one in which a character announces that Winter will be sacrificed, as no aquarium will receive a disabled animal (Student-061, female, 2015). Perhaps it can be said that ethics and values are important aspects of systems thinking (and not emotional components separate from reason), and that they guided this integrative creative thinking in seeking a solution to Winter's injury: the development of a prosthetic tail in interdisciplinary work, which is connected to both the umbrella term 1 ("*resilience*") and umbrella term 4 ("*science-technology-innovation*"). In this case, environmental concern is motivated by true care for nature as a value (Lewis et al., 2008), although it can be acknowledged that environmental concern can also be for the purpose of caring for nature as a human resource (Nilsson & Küller, 2000).

Exposing the students to the *Dolphin Tale* also led to an increase in awareness about diversity and respect among human beings: "When the mother arrives to visit Winter with her daughter who is also disabled, at that moment the girl with a disability felt somehow represented; she even tells her mother that Winter is just like her" (Student-114, female, 2017). This is in accordance with the 1977 Intergovernmental Conference on Environmental Education recommendation, which stated that environmental education should contribute to the search for a new ethic based on respect for nature, for people and their dignity, and for a future with quality of life to which all will have access (UNESCO, 1978).

About “science-technology-innovation”

Umbrella term 4 (“*science-technology-innovation*”) is strongly connected to the sense of reality: that the screenplay is based on a real story seemed to be very important to the students. One of them highlighted "the final scene, of the credits, for evidencing and reinforcing the point of view that the engagement for the recovery of Winter is not a fictional/cinematic story but a real effort that mobilized different actors, who, together, contributed to its health/preservation" (Student-008, female, 2015).

This umbrella term is based on the recognition of the importance of scientific knowledge and the development of technologies for environmental problems and the importance of cooperation and the integrative interplay of different academic disciplines. This integrative interplay can lead to interdisciplinarity, which is the core pillar of environmental education. That is why, instead of a Biodiversity education, as proposed by Navarro-Perez and Tidball (2012), Saito (2013) proposes using the expression *Environmental Education* only, in its full original interdisciplinary approach. Also, this author proposes to go beyond the (ecological or conservation) literacy to encompass environmental education in its socio-environmental framework. In this sense, socio-environmental conflict can behave as a methodological approach to environmental education (and Winter's injury from being entangled in a crab trap line is a socio-environmental conflict). A student demonstrated this understanding: "In the classroom, we observe environmental education as a transversal theme. Therefore, in the movie, the knowledge acquired by Sawyer goes through several areas of science, such as Biology and Engineering" (Student-207, male, 2019).

Umbrella term 4 relates to the emotional attachment between human beings and dolphins (umbrella term 2 “*emotion”*) and to the importance of individuals’ awareness of collective action (umbrella term 3 “*environmental concern*”) and it was carefully brought onto the scene to highlight umbrella term 1 (“*resilience*”), which encompasses the two most highlighted words that came to mind for the students: “overcoming” and “perseverance”. These two top words were also reinforced when the students talked about which scenes most positively impacted them and the lessons they learned: "The moment when Winter accepts the last prosthesis and starts swimming with its natural movements" (Student-013, female, 2015); "The scene where the dolphin adapts to the prosthesis" (Student-129, male, 2017). Here it can be noticed that there is a narrow distance to the first umbrella term (“*resilience*”).

About “resilience”

Some student thoughts were strongly connected to the idea of “*resilience*” (umbrella term 1): "Persistence in helping the dolphin, which is the symbol of hope" (Student-182, male, 2018); "The movie shows us that it is very important not to give up on ideas even if they are not viable at first. And that, to reach a certain end, it takes a lot of effort and passion. It is also very important to listen to what children have to say, promoting dialog and valuing their world views" (Student-170, female, 2018); and, "The lesson learned is that no matter how many times you fail in a given task, hold on just a minute and an analytical look is enough for success to occur" (Student-197, male, 2019). It can be argued that all of these remarks are supported by the powerful,

universal image of a hero (Campbell, 2004) and the fact that trauma survivors who choose to overcome and recover may be viewed as individuals embarking on a hero's journey (Keck et al., 2017): "[I learned that] it is possible, if life changes your plans, to draw new plans for living, to overcome bad things, and also how animals can help us with this, how Winter has changed the lives of many people" (Student-183, female, 2018).

Resilience in facing socio-environmental conflicts and contemporary challenges demands encompassing, participatory ways to solve these problems and achieve sustainable development: "When Sawyer talks to people about Winter and promotes the event to get to know her, he is actually working to teach and raise awareness about the importance of keeping the marine hospital open: this is environmental education" (Student-097, female, 2017). In truth, the search for solutions is in the core of the environmental education goals, which is "to develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones" according to the Belgrade Charter, the final document from the 1975 Belgrade International Workshop on Environmental Education.

The idea of resilience is present when people can overcome difficulties and act in favor of the environment, mobilizing more people to embrace the same cause. One student was able to figure out the involved efforts and the committed energy in the participatory process: "The scene that most impacted me was the process of organizing 'Save Winter Day'. The movie did not give many details or show the difficulties in organizing and mobilizing civil society in order to help a cause. It should have been a great challenge for them: a challenge of logistics, finances and marketing" (Student-111, male, 2017). This is in accordance with Recommendation 3 of the 1977 Tbilisi Intergovernmental Conference on Environmental Education, which states that Member States should integrate environmental education into their general policy in order to "seek, by means of environmental education, gradually to transform attitudes and behaviour so that all members of the community may be made aware of their responsibilities in the thinking through formulation and application of national or international environmental programmes" (UNESCO, 1978). It addresses the collective responsibility and the necessity to believe and make possible to move from passivity to activity in favor of the environment. The movie brought inspiration to this attitude change.

It has been proposed that this activity of watching the *Dolphin Tale*, and subsequently, being stimulated to think about it, may have led students to accomplishing sensitization, attitudinal development and awareness relative to biodiversity conservation, combining at least cognitive components and affective components of pro-environmental attitudes, which can influence behavior when situational factors are favorable (Marcinkowski & Reid, 2019).

Although this article summarizes student ideas accumulated over five years, in each class the quick view of the most frequently used words was linked to several previous general introductory themes relative to environmental education. The goal was that students would find themselves and their opinions in the introductory

framework of the course (values and ethics, interdisciplinary, biodiversity concern, social commitment and action, sustainability). This is in accordance with what Kavan and Burne (2009) recommended for the use of movies in higher education. To make this use effective, it must be incorporated into assessments and structured discussions.

Conclusion

The *Dolphin Tale* presents Winter's story in a very captivating and educational way. The research performed over five years with undergraduate and graduate students confirms that both knowledge and emotion were effected by the movie. The top ten spontaneous words (“overcoming”, “perseverance”, “tenderness”, “care”, “inspiration”, “will”, “friendship”, “love”, “rehabilitation”, and “sustainability”) were reinforced and justified by students’ complementary answers and represent the real impact of the story on their beliefs and knowledge.

It can be concluded that *Dolphin Tale* helped to accomplish the two main goals of environmental education: 1) to understand the complex nature of the environment resulting from the interactions of its biological, physical, social, economic and cultural components; and 2) to acquire the knowledge, values, attitudes, and practical skills necessary to anticipate and solve environmental problems (UNESCO, 1978).

Unfortunately, Winter passed away on November 11, 2021 resulting from an intestinal abnormality. Winter's obituary written by the Clearwater Marine Aquarium reinforces the same ideas expressed by students in this research: "Though Winter’s time with us has come to an end, her spirit and inspiration will continue to live on in our hearts forever.”

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References

Alyaz, Y., Isigicok, E. & Gursoy, E. (2017). The Impact of the Environmental Documentary Movies on Pre-service German Teachers‟ Environmental Attitudes. *Journal of Education and Training Studies, 5*(1), 159-170. https://doi.org/10.11114/jets.v5i1.1976

Anthes, E. (2013). A dolphin's tale: A bottlenose named Winter lost her tail to a crab trap, so scientists built her a new one. *Scientific American, 308*(3), 78-81.

Bardin, L. (1977). *L'analyse de contenu*. Presses Universitaires de France-PUF.

Bartsch, A. (2008). Meta-Emotion: How Films and Music Videos Communicate Emotions About Emotions. *Projections, 2*(1), 45-59.

Blasco, P. G., Moreto, G., Blasco, M. G., Levites, M. R. & Janaudis, M. A. (2015). Education through Movies: Improving teaching skills and fostering reflection among students and teachers. *Journal for Learning through the Arts, 11*(1), 1-16. https://doi.org/10.21977/D911122357

Campbell, J. (2004). *The hero with a thousand faces* - Commemorative Edition. Princeton University Press.

Curtin, S. (2006). Swimming with Dolphins: a Phenomenological Exploration of Tourist Recollections. *International Journal of Tourism Research, 8*(4), 301-315. https://doi.org/10.1002/jtr.577

Forestell, P. H. (1993). If Leviathan has a face, does Gaia have a soul?: Incorporating environmental education in marine eco-tourism programs. *Ocean & Coastal Management, 20*(3), 267-282. https://doi.org/10.1016/0964-5691(93)90070-F

Gomerčić, M. D., Galov, A., Gomerčić, T., Škrtić, D., Ćurković, S., Lucić, H., Vuković, S., Arbanasić, H. & Gomerčić, H. (2009). Bottlenose dolphin (*Tursiops truncatus*) depredation resulting in larynx strangulation with gill-net parts. *Marine Mammal Science, 25*(2), 392-401. https://doi.org/10.1111/j.1748-7692.2008.00259.x

Holling, C. (1973). Resilience and stability of ecological systems. *Annual review of ecology and systematics, 4*(1), 1-23. https://doi.org/10.1146/annurev.es.04.110173.000245

Janpol, H. L. & Dilts, R. (2016). Does viewing documentary films affect environmental perceptions and behaviors? *Applied Environmental Education & Communication, 15*(1), 90-98. https://doi.org/10.1080/1533015X.2016.1142197

Jayasinghe, I. & Darner, R. (2021). Do emotions, nature relatedness, and conservation concern influence students' evaluations of arguments about biodiversity conservation? *Interdisciplinary Journal of Environmental and Science Education, 17*(1), e2230. https://doi.org/10.29333/ijese/9157

Kassas, M. (2002). Environmental education: Biodiversity. *Environmentalist, 22*(4), 345-351. https://doi.org/10.1023/A:1020766914456

Kavan, H. & Burne, J. (2009). Using Film to Teach Communication Concepts at University. *The International Journal of Learning, 16*(10), 429-440. https://

doi.org/10.18848/1447-9494/CGP/v16i10/46655

Keck, B., Compton, L., Schoeneberg, C. & Compton, T. (2017). Trauma Recovery: A Heroic Journey. *Heroism Science, 2*(1), Article 5. https://doi.org/10.26736/hs.2017.01.05

Lewis, E., Mansfield, C. & Baudains, C. (2008). Getting down and dirty: Values in education for sustainability. *Issues in Educational Research, 18*(2), 138-155.

Marcinkowski, T. & Reid, A. (2019). Reviews of research on the attitude-behavior relationship and their implications for future environmental education research. *Environmental Education Research, 25*(4), 459-471. https://doi.org/10.1080/13504622.2019.1634237

Marczak, M. & Sorokowski, P. (2018). Emotional Connectedness to Nature Is Meaningfully Related to Modernization. Evidence From the Meru of Kenya. *Frontiers in Psychology, 9*, article 1789. https://doi.org/10.3389/fpsyg.2018.01789

Navarro-Perez, M. & Tidball, K.G. (2012). Challenges of biodiversity education: A review of education strategies for biodiversity education. *International Electronic Journal of Environmental Education, 2*(1), 13-30.

Nilsson, M. & Küller, R. (2000). Travel behaviour and environmental concern. *Transportation Research Part D: Transport and Environment, 5*(3), 211-234. https://doi.org/10.1016/S1361-9209(99)00034-6

Nisbet, E.K., Zelenski, J. M. & Murphy, S. A. (2009). The Nature Relatedness Scale: Linking Individuals' Connection With Nature to Environmental Concern and Behavior. *Environment and Behavior, 41*(5), 715-740. https://doi.org/10.1177/0013916508318748

Ojala, M. (2012). Hope and climate change: The importance of hope for environmental engagement among young people. *Environmental Education Research, 18*(5), 625-642. https://doi.org/10.1080/13504622.2011.637157

Oliveira, E., Martins, P. & Chambel, T. (2013). Accessing movies based on emotional impact. *Multimedia Systems, 19*(6), 559-576.

Saito, C. H., Pedroza, L. P., Zatz, M. G., Santos, G. B., Gomes, L. A. H., Ramos, G. T., Teixeira, A. C. A. N., Souza, M. A., Scherer, S. D., Bastos, D., Lobo, T. O. T. A., Oliveira, M. C., Sebata, E. G., Silva, R. N., Lima, A. S., Abreu, L. C. R., Sant'Anna, M. E. & Monteiro, A. M. F. (2002). A matança dos gatos na UnB: estilhaços da distância entre homens e animais. *Revista Eletrônica do Mestrado em Educação Ambiental, Rio Grande-RS, 9*(Jul-Dec): 124-136.

Saito, C. H., Gomes, M. R. & Almeida, L. E. (2011). Does a Baconian Vision of Nature Dominate Among Researchers in Ecology? A Case Study in an Ecological Reserve of the IBGE in Central Brazil. *Human Ecology, 39*(6), 835-839. https://doi.org/10.1007/s10745-011-9440-9

Saito, C. H. (2013). Environmental Education and Biodiversity Concern: Beyond the Ecological Literacy. *American Journal of Agricultural and Biological Sciences,*

8(1), 12-27. https://doi.org/10.3844/ajabssp.2013.12.27

Saito, C. H. (2016). Concept Map for Environmental Education Planning: Capacitation of Volunteers for the FIFA Football World Cup in Brazil. *Journal of Education for Sustainable Development, 10*(2), 289-308. https://doi.org/10.1177/0973408216651944

Saito, C. H., Saito, I. T. & Ribeiro, I. C. (2018). A teoria dos Campos Mórficos e a Emergência da visão sistêmica sobre o equilíbrio no meio ambiente. *Pesquisa em Educação Ambiental, 13*(2), 69-81. https://doi.org/10.18675/2177-580X.vol13.n2.p69-81

Schoen, S. W. (2016). Blackfish-ing for Buzz: The Rhetoric of the Real in Theme Parks and Documentary. *Journal of Florida Studies, 1*(5), article pages not numbered. https://www.journaloffloridastudies.org/files/vol0105/05Schoen.pdf

Sheldrake, R. (1994). *The Rebirth of Nature: The Greening of Science and God*. Park Street Press.

Sheldrake, R. (2009). *Morphic Resonance: the nature of Formative Causation*. Park Street Press.

Snape, R. T. E., Broderick, A. C., Çiçek, B. A., Fuller, W. J., Tregenza, N., Witt, M. J. & Godley, B. J. (2018). Conflict between Dolphins and a Data-Scarce Fishery of the European Union. *Human Ecology, 46*(3), 423-433. https://doi.org/10.1007/s10745-018-9989-7

Steele, A. & Scott, J. (2016). Emotionality and Learning Stories: Documenting How We Learn What We Feel. *Canadian Journal of Environmental Education, 21*, 106-124.

Toledo, M. A., Yangco, R. T. & Espinosa, A. A. (2014). Media Cartoons: Effects on Issue Resolution in Environmental Education. *International Electronic Journal of Environmental Education, 4*(1), 19-51. https://doi.org/10.18497/iejee-green.99250

Trombulak, S. C., Omland, K. S., Robinson, J. A., Lusk, J. J., Fleischner, T. L., Brown, G. & Domroese, M. (2004). Principles of conservation biology: Recommended guidelines for conservation literacy from the education committee of the society for conservation biology. *Conservation Biology, 18*(5), 1180-1190. https://doi.org/10.1111/j.1523-1739.2004.01851.x

UNESCO (1978). *Intergovernmental Conference on Environmental Education*. Paris: UNESCO.

Waller, R. L. & Iluzada, C. L. (2020). Blackfish and SeaWorld: A Case Study in the Framing of a Crisis. *International Journal of Business Communication, 57*(2), 227-243. https://doi.org/10.1177/2329488419884139

Wells, R. S. & Scott, M. D. (2009). Common Bottlenose Dolphin: Tursiops truncatus, in: Perrin, W. F., Würsig, B., Thewissen, J.G.M. (Eds.), *Encyclopedia of Marine Mammals* - Second Edition. Academic Press-Elsevier, pp. 249-255. https://doi.org/10.1016/B978-0-12-373553-9.00062-6

Notes

[1] https://www.apa.org/topics/resilience

[2] https://blog.nationalgeographic.org/2011/10/12/a-dolphin-tale-the-real-life-rescue-behind-the-movie/