



RESEARCH ARTICLE

Underwater Photography as an Educational Tool for Environmental Awareness and Marine Conservation

Nazrul Azha Abu Hassan^{1*}, Adzrool Idzwan Ismail², Siti Salmi Jamali³¹School of Creative Industry Management & Performing Arts, Universiti Utara Malaysia, Malaysia.

Faculty Communication, Visual Art & Computing, Universiti Selangor.

^{2,3}School of Creative Industry Management & Performing Arts, Universiti Utara Malaysia, Malaysia.**ARTICLE INFO**

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nazrul@unisel.edu.my

ABSTRACT

This study aims to evaluate the effectiveness of underwater photography as an academic tool for promoting environmental awareness and supporting the conservation of marine ecosystems. A mixed-methods approach is employed to collect data, including surveys, interviews, and document analysis. The perspectives of various stakeholders, such as students, educators, conservationists, and educational materials, are taken into consideration. The study investigates how underwater photography influences students' engagement, knowledge, attitudes, and behaviors towards marine ecosystems and conservation. Quantitative analysis involves descriptive and inferential statistics, while qualitative analysis employs thematic analysis of interviews and documents. Ethical considerations, limitations, and challenges associated with researching this topic are also acknowledged. The study's results indicate that underwater photography significantly enhances students' engagement and knowledge about marine ecosystems. Furthermore, it provides recommendations for improving educational practices and advancing marine conservation efforts.

INTRODUCTION

Marine ecosystems are considered some of the most biodiverse and essential components of our planet. However, they are currently facing significant threats stemming from pollution, overfishing, and climate change. Despite their critical role, many individuals remain unaware of the diverse life forms and intricate processes that take place beneath the ocean's surface. Thus, it is of utmost importance to increase environmental awareness and cultivate a sense of responsibility towards marine conservation.

One promising approach to bolstering environmental education lies in the utilization of underwater photography. This medium possesses a distinct and captivating ability to bring the concealed underwater world to the forefront of public consciousness. By visually capturing the captivating beauty and intricate nature of marine life, underwater photography emerges as a formidable tool that can inspire and educate individuals about the indispensable value of marine conservation.

THE IMPORTANCE OF ENVIRONMENTAL EDUCATION

Environmental education plays a vital role in promoting sustainable practices and fostering a deeper understanding of the natural world. As we face increasingly urgent environmental challenges such as climate change, biodiversity loss, and pollution, the importance of environmental education becomes even more evident. This discussion highlights the crucial role that environmental education plays in raising awareness and inspiring actions towards a future defined by sustainability as follows:

i. Promoting Awareness

Environmental education plays a vital role in helping individuals grasp complex environmental issues by providing scientific knowledge and contextual information. This field effectively breaks down topics such as climate change, ecosystem dynamics, and conservation strategies, making them readily understandable and accessible to diverse audiences.

By illustrating both the direct and indirect impacts of human activities on the environment, environmental education emphasizes the significance of adopting sustainable practices. This awareness is crucial in conveying the message that individual and collective actions have a substantial impact on the overall health of our planet.

In the realm of environmental education, it is crucial to establish a meaningful connection between global environmental issues and the local context, as well as individuals' everyday lives. Such an approach enables individuals to grasp the profound impact that their daily choices, ranging from energy consumption and waste management to dietary habits, have on broader environmental outcomes. By fostering this connection, environmental education cultivates a profound sense of personal responsibility and empowerment.

ii. Inspiring Action

Awareness alone is not enough; behavioral change must accompany it. Environmental education highlights the importance of taking practical steps to mitigate environmental impacts. It offers practical guidance on how individuals can reduce their carbon footprint, conserve natural resources, and support conservation efforts.

Promoting Environmental Stewardship: Environmental education fosters a sense of stewardship by instilling values of respect and care for the natural world. It encourages individuals to actively engage in environmental protection, whether through community clean-ups, advocacy, or adopting sustainable lifestyle choices.

Empowering Communities: Environmental education has the potential to mobilize communities by promoting collective action. It encourages community-based initiatives that address local environmental issues, fostering collaboration and shared responsibility. Engaged communities are more capable of advocating for policy changes and supporting sustainable development projects.

Supporting Policy and Decision-Making: Informed citizens are more likely to support and advocate for effective environmental policies. Environmental education equips individuals with the knowledge and skills necessary to participate in environmental decision-making processes. This participation is crucial for driving systemic changes that align with sustainability goals.

iii. Addressing Global Challenges

Environmental education plays a crucial role in combatting climate change. By educating individuals on the causes and consequences of climate change, as well as the significance of reducing greenhouse gas emissions, environmental education fosters a proactive approach to addressing climate issues.

Biodiversity Conservation: Understanding the importance of biodiversity and the threats it faces is paramount for conservation efforts. Environmental education highlights the interconnectedness of all living organisms and the necessity of safeguarding habitats and species. This knowledge inspires endeavours to preserve biodiversity through conservation initiatives and sustainable practices.

Promoting Sustainable Development: Environmental education upholds the principles of sustainable development by emphasizing the need to strike a balance between economic growth and environmental protection. It encourages the adoption of sustainable practices in diverse sectors, such as agriculture, industry, and urban development, ensuring that development meets current needs without compromising the well-being of future generations.

Environmental education serves as a powerful tool in promoting sustainable practices and fostering a deeper understanding of our natural world. By raising awareness, inspiring action, and addressing global challenges, it plays a crucial role in shaping a sustainable future. As we continue to face pressing environmental issues, the importance of role of underwater photography (*Figure 1*) in environmental education in cultivating informed, responsible, and proactive global citizens are suggested and cannot be overstated.



Figure 1. Underwater Photography

LITERATURE REVIEW

Underwater photography as an educational tool for environmental awareness and marine conservation reveals several key insights. Research indicates that visual media, including underwater photography, plays a significant role in environmental education by making abstract concepts more tangible and emotionally engaging. Studies show that compelling images of marine environments can evoke emotional responses that drive conservation behaviors. Additionally, the use of underwater photography in educational settings has been effective in increasing knowledge and fostering positive attitudes toward marine conservation. Successful programs and conservation campaigns that incorporate underwater imagery have demonstrated their ability to engage the public and drive support for marine initiatives. Methodologically, both qualitative and quantitative approaches are used to assess the impact of underwater photography, providing valuable insights into its effectiveness. However, there are opportunities for future research to explore innovative integration with emerging technologies and to assess the long-term impact on conservation behaviors. Overall, the literature underscores that underwater photography is a powerful tool for enhancing environmental awareness and promoting marine conservation, highlighting its potential to foster a deeper connection between people and the ocean.

These studies collectively support the notion that visual media, such as underwater photography, significantly enhances environmental education by offering a vivid and emotionally engaging experience. For instance, research by Muehlebach (2010) highlights how visual media, including underwater images, can make abstract environmental concepts more tangible and relatable. Similarly, Smith et al. (2015) found that compelling imagery improves public engagement by evoking emotional responses, thereby increasing awareness and understanding of conservation issues. Anderson and Morrow (2013) further demonstrated that incorporating visual elements into educational materials enhances student retention and engagement with environmental topics. As well, Davis and Slater (2014) showed that underwater photography effectively raises public awareness and fosters positive attitudes toward marine conservation. Collectively, these studies illustrate that underwater photography not only aids in conveying complex environmental messages but also motivates individuals to actively participate in conservation efforts.

METHODOLOGY

The research design and approach play a crucial role in guiding the investigation into the efficacy of underwater photography as an educational tool for promoting environmental awareness and marine conservation. This study employs a mixed-methods approach, which combines both qualitative and quantitative methodologies to ensure a comprehensive understanding of the research questions.

The qualitative component of the study involves conducting in-depth interviews with educators, conservationists, and practitioners in the field of marine science and environmental education. These interviews offer valuable insights into the subjective experiences, perspectives, and challenges associated with the use of underwater photography in educational contexts. Additionally, qualitative data collection techniques such as focus groups and participant observation are employed to explore nuanced themes and identify emerging patterns within the data.

On the other hand, the quantitative aspect of the research involves surveying a diverse sample of students, educators, and community members to gather quantitative data on the impact of underwater photography on environmental knowledge, attitudes, and behaviours. By utilising both qualitative and quantitative approaches, this research design ensures the triangulation of findings, enhances the validity and reliability of the results, and provides a comprehensive understanding of the complex dynamics at play. Furthermore, this mixed-methods approach allows for the integration of multiple perspectives, thereby enriching the analysis and interpretation of the data. Overall, the research design and approach employed in this study demonstrate a rigorous and systematic methodology that aims to uncover the role of underwater photography in environmental education and marine conservation.

Ethical Considerations

Ethical considerations play a crucial role in any research endeavour, particularly when examining sensitive subjects such as environmental education and marine conservation. When investigating the effectiveness of underwater photography in these areas, researchers must carefully address several ethical concerns. First and foremost, obtaining informed consent is essential to ensure that participants possess a comprehensive understanding of the research's purpose, procedures, and potential risks and benefits. This necessitates obtaining consent from students, educators, and other stakeholders involved in surveys, interviews, or other data collection activities.

Additionally, researchers must prioritise participants' autonomy and confidentiality, safeguarding their identities and responses by maintaining strict confidentiality and anonymising data whenever possible. Moreover, researchers must be mindful of the potential harm or discomfort that participants may experience, particularly when discussing sensitive topics such as environmental

degradation, species loss, or human impact on marine ecosystems. Sensitivity to cultural, social, and ecological contexts is critical to prevent distress or the perpetuation of stereotypes.

Furthermore, researchers should uphold principles of integrity, honesty, and transparency throughout the research process, accurately presenting findings and acknowledging any conflicts of interest or biases. Lastly, researchers must consider the broader implications of their research on environmental conservation and social justice, striving to conduct ethically responsible, socially equitable, and environmentally sustainable research. By addressing these ethical considerations, researchers can uphold the integrity of their research and contribute to positive outcomes for both participants and the wider community.

DATA COLLECTION METHODS

To conduct an in-depth study on the influence of underwater photography on environmental consciousness and marine preservation, it is imperative to utilize a range of data collection techniques. By incorporating multiple stakeholders, these methods have facilitated a comprehensive comprehension of the subject matter. The following data collection methods are implemented:

Research Design

The design of structured surveys and questionnaires can effectively aid in the collection of quantitative data regarding participants' attitudes, knowledge, and behaviors related to marine conservation. In a study involving 100 participants, baseline data can be gathered through a pre-exposure survey, followed by an intervention where participants are exposed to underwater photography that highlights marine conservation issues. This data can be gathered both before and after participants are exposed to underwater photography. By employing this method, statistical analysis becomes feasible, facilitating a comparison of responses and providing measurable insights into the impact of photography on environmental awareness.

Interviews

The conduct of semi-structured interviews with educators, conservationists, photographers, and students presents an opportunity to delve deeper into their experiences, perspectives, and challenges in relation to the use of underwater photography in education. These interviews yield valuable qualitative data, enabling a nuanced understanding of the effectiveness of photography as an educational tool and the factors that influence its implementation.

Interviews with Educators and Conservationists

Interviews with educators and conservationists play a pivotal role in the research methodology, offering a comprehensive and detailed understanding of the practicalities, challenges, and potential benefits associated with integrating underwater photography into environmental education. These interviews provide a platform for professionals with expertise in education and conservation to share their valuable insights, experiences, and perspectives on the role of visual media in promoting environmental awareness and marine conservation. By using open-ended and probing questions, researchers can delve into the motivations, strategies, and best practices employed by educators and conservationists when incorporating underwater photography into their educational initiatives. PADI (2007), emphasizes the importance of maintaining neutral buoyancy to facilitate smooth and effortless movement in all directions. This state of balance not only makes diving more enjoyable but also helps protect the underwater environment. Educators may discuss their pedagogical approaches, classroom experiences, and observations of student engagement and learning outcomes, providing valuable information on the effectiveness of underwater photography as a teaching tool.

On the other hand, conservationists can offer insights into communication strategies, outreach efforts, and advocacy campaigns that utilise visual media to raise awareness and mobilise support for marine conservation initiatives. By engaging in dialogue with professionals actively involved in the field, researchers gain access to first-hand knowledge, real-world examples, and practical advice that enrich the research findings and inform future practices.

Additionally, interviews foster collaboration and knowledge exchange between researchers and practitioners, thereby promoting a deeper understanding of the complexities and nuances involved in environmental education and conservation work. Through these in-depth discussions, educators and conservationists become active participants in the research process, contributing valuable perspectives and insights that enhance the overall quality and relevance of the study.

Focus Groups

The organization of focus group discussions involving a diverse range of stakeholders, including students, teachers, and community members, facilitates collaborative exploration of ideas, attitudes, and perceptions concerning underwater photography and marine conservation. These focus groups foster interaction and the exchange of ideas, revealing common values, concerns, and potential strategies for incorporating photography into educational programs.

Observations

Engaging in participant observation entails directly observing educational activities, workshops, or outreach events that incorporate underwater photography. These observations enable researchers to witness the dynamics of learning environments, the engagement of participants, and the efficacy of photography in conveying environmental messages.

Document Analysis

Through the analysis of educational materials, curricula, and visual resources related to marine conservation and underwater photography, valuable context and insights into current practices can be gained. This process of document analysis also facilitates the identification of trends, gaps, and best practices in the integration of photography into environmental education.

Social Media Analysis

The examination of online platforms and social media channels specifically dedicated to marine conservation and underwater photography can provide valuable insights into public perceptions, trends, and levels of engagement. By analyzing user-generated content, comments, and discussions, a snapshot of how photography is being utilized to promote environmental awareness and advocacy can be obtained. By employing a variety of data collection techniques, researchers are able to procure information from diverse sources, thereby corroborating their findings, substantiating their interpretations, and attaining a comprehensive understanding of the manner in which underwater photography serves as a means for environmental education and marine conservation. Furthermore, by integrating both quantitative and qualitative methodologies, researchers can delve deeply into the subject matter, while considering the multifaceted perspectives and experiences of the relevant stakeholders.

RESULT AND DISCUSSION

Analysis of Educational Programs and Curricula

The analysis of educational programmes and curricula is a critical step in comprehending the integration of underwater photography into environmental education initiatives. This examination involves conducting a thorough review of existing educational materials, programmes, and curricula that incorporate underwater photography as a pedagogical tool. By scrutinising these

resources, researchers can obtain valuable insights into the diverse ways in which underwater photography is utilised to enhance learning experiences and foster environmental consciousness.

This analysis encompasses a broad range of materials, including textbooks, lesson plans, online resources, and multimedia presentations, across various educational levels and disciplines. Researchers evaluate the content, structure, and instructional strategies employed in these materials to identify patterns, trends, and best practices in the integration of underwater photography. Additionally, researchers assess how these educational programmes and curricula align with established learning objectives, educational standards, and conservation goals. By examining the incorporation of underwater photography into existing educational frameworks, researchers can identify gaps, challenges, and opportunities for enhancing environmental education practices.

Moreover, this analysis aids in identifying innovative approaches, exemplary models, and potential areas for future research and development. Ultimately, the analysis of educational programmes and curricula serves as a basis for making evidence-based decisions, designing effective interventions, and advancing the field of environmental education by integrating visual media for marine conservation.

Comparative Analysis of Different Educational Approaches

A comparative analysis examines the effectiveness of underwater photography as an educational tool in comparison to other methods. It reveals the unique strengths and benefits of underwater photography in promoting environmental awareness and marine conservation. Traditional approaches rely on textbooks, lectures, and discussions, while underwater photography offers a dynamic and immersive alternative. The study's results indicate that underwater photography significantly enhances students' engagement and knowledge about marine ecosystems. Quantitative analysis reveals a positive correlation between exposure to underwater photography and improved attitudes towards marine conservation. The survey data showing that students who participated in underwater photography activities demonstrated a greater willingness to engage in conservation behaviors can be justified by the unique impact of visual experiences on learning and motivation.

Underwater photography not only highlights the beauty and diversity of marine life but also brings attention to the threats these ecosystems face. This visual exposure enhances students' understanding of environmental issues, making them more aware of the need for conservation. Additionally, the emotional connection fostered by seeing these vivid images can evoke empathy and a personal sense of responsibility, motivating students to take action. The immersive nature of photography allows students to experience marine environments in a way that traditional learning methods may not, leading to a stronger commitment to engage in behaviors that support marine conservation.

While, Qualitative analysis of interviews and documents highlights recurring themes of increased curiosity, emotional connection to marine life, and a deeper understanding of ecological issues. According to underwater photography expert Bahaman Hashim, underwater photography engages students on a sensory and emotional level with vivid visuals that evoke curiosity and foster a deep connection to marine ecosystems. Unlike digital simulations or virtual reality, underwater photography provides an authentic glimpse into the natural world, cultivating genuine appreciation for marine life. Educators and conservationists reported that underwater photography serves as a powerful visual tool, making abstract concepts more tangible and fostering a sense of stewardship among students.

Despite challenges such as accessibility and resource limitations, the findings underscore the potential of underwater photography to enrich environmental education and support marine

conservation initiatives. It is also accessible to diverse audiences and cultures worldwide. However, underwater photography has limitations. It may lack interactivity and customization offered by digital tools, and logistical constraints may prevent its use in every educational setting. Nevertheless, when used together with hands-on activities, field trips, and multimedia presentations, it enhances the learning experience and provides a holistic perspective on marine conservation. This analysis highlights the immense potential of underwater photography as an educational tool for inspiring curiosity, fostering empathy, and empowering students to protect the ocean.



Figure 2. Example of Practical Application Classrooms

Practical Application in Classrooms

The integration of underwater photography into educational settings has proved to be highly effective, as demonstrated by its practical applications. This integration offers compelling examples of how it can transform student learning and engagement. Within the realm of marine biology classrooms, educators have successfully utilised underwater photography to bring abstract scientific concepts to life. This approach provides students with immersive experiences that deepen their understanding of marine ecosystems (*Figure 2*). For instance, through the utilisation of breathtaking underwater images, virtual dives into coral reefs enable students to explore real-time biodiversity, habitat dynamics, and species interactions. Consequently, this fosters a sense of connection and curiosity. Similarly, in the field of environmental science, educators have employed underwater photography to illustrate the impact of human activities on marine environments, as well as to inspire discussions about conservation strategies. By conducting comparisons between images of pristine marine habitats and those that have been degraded by pollution or habitat destruction, students develop a greater appreciation for the significance of conservation efforts and the necessity of sustainable practices.

Furthermore, the practical applications of underwater photography extend beyond the confines of the classroom. As Robertson (2014) states, "Underwater photography requires not only skill in photography but also a deep understanding of marine life and the aquatic environment". Educators organise field trips, citizen science projects, and community outreach events centred around this medium. Through these hands-on experiences, students are able to apply their knowledge in real-world contexts, engage with local conservation initiatives, and contribute to scientific research endeavours. These exemplifications clearly demonstrate that underwater photography is a

powerful educational tool that transcends traditional boundaries. It not only sparks curiosity and fosters empathy, but also instils in students a lifelong passion for marine conservation.

Implications for Environmental Education

The findings of this research have profound implications for the future of environmental education, demonstrating a shift towards more engaging and impactful instructional approaches. The research highlights the crucial role of visual media, specifically underwater photography, in capturing learners' attention and fostering a strong connection to environmental issues. By utilising imagery to evoke emotions, stimulate curiosity, and inspire action, environmental educators can harness the power of underwater photography as a potent tool for promoting environmental literacy and stewardship among students.

Furthermore, the findings underscore the significance of experiential learning and authentic engagement with nature in environmental education. By providing students with opportunities to explore marine ecosystems through firsthand experiences, such as virtual dives or field trips enriched by underwater photography, educators can facilitate deeper learning, critical thinking, and meaningful connections with the natural world. Additionally, new approaches to understanding the visual experience through the use of information and language theory are proposed, examining the underlying ideas within visual communication studies. As Jamieson (2007) explains, new approaches to understanding visual experience utilize information and language theory, while also delving into the underlying concepts within visual communication studies. The research also emphasises the necessity for interdisciplinary and holistic approaches to environmental education that integrate scientific knowledge with artistic expression, cultural perspectives, and ethical considerations. By embracing a multidimensional understanding of environmental issues, educators can empower students to address complex challenges and envision sustainable solutions for the future.

In addition, the research highlights the importance of fostering a sense of agency and empowerment among students, enabling them to recognise their ability to effect positive change in their communities and beyond. By instilling a sense of responsibility and commitment to environmental stewardship, environmental education can inspire a new generation of environmental leaders and advocates who are equipped to tackle the urgent ecological challenges facing our planet. Ultimately, the findings of this research pave the way for a more inclusive, innovative, and impactful approach to environmental education that cultivates a profound appreciation for the natural world and empowers individuals to become active agents of positive change in their communities and the world at large.

Enhancing Understanding of Marine Ecosystem

The research on the impact of underwater images on students' understanding of marine biology concepts has revealed that they have a significant effect on enhancing their comprehension of marine ecosystems. Through the utilisation of underwater photography, students are afforded a unique opportunity to delve into the intricate complexities of marine life in its natural environment. By examining captivating images of coral reefs teeming with vibrant marine organisms, expansive oceanic landscapes, and elusive marine species, students gain an immediate glimpse into the diversity, interconnectedness, and ecological dynamics of marine ecosystems. These visual representations serve as potent educational tools by bridging the divide between abstract scientific concepts and tangible real-world experiences. By situating marine biology concepts within visually stunning imagery, students can visualise complex biological processes, ecological relationships, and ecosystem dynamics with clarity and depth.

Furthermore, underwater images stimulate curiosity and encourage inquiry, propelling students to pose questions, make observations, and engage in meaningful discussions regarding the intricacies

of marine life. Through this process of visual learning, students develop a deeper appreciation for the beauty, complexity, and fragility of marine ecosystems, fostering a sense of connection and empathy towards the natural world. Ultimately, the research underscores the transformative potential of underwater photography in enhancing students' understanding of marine biology concepts and cultivating a lifelong commitment to marine conservation.

Changing Attitudes and Behaviours towards Conservation

The study investigating the potential impact of underwater photography on students' conservation behaviours highlights the efficacy of visual media in fostering a more robust commitment to marine conservation. Immersive encounters with underwater photography not only cultivate an appreciation for the beauty and biodiversity of marine ecosystems but also instil an acute awareness of the pressing need for conservation measures. By directly witnessing the magnificence of underwater life and the imminent threats facing marine environments, students develop a heightened consciousness and empathy towards the natural world. This emotional connection serves as a potent catalyst for change, prompting students to reassess their attitudes, values, and behaviours pertaining to conservation. By engaging with underwater imagery and engaging in reflective practices, students are motivated to adopt more sustainable habits, minimise their ecological footprint, and actively contribute to conservation initiatives.

Additionally, exposure to underwater photography nurtures a sense of stewardship and accountability, empowering students to champion marine conservation within their communities and beyond. This research delves into the influence of underwater photography on students' conservation behaviours, underscoring the pivotal role of visual media in shaping attitudes and inspiring concerted action to safeguard the well-being and vibrancy of marine ecosystems for future generations.

Challenges and Opportunities in Using Underwater Photography

The exploration of challenges and opportunities in implementing underwater photography in education reveals a complex landscape shaped by barriers and transformative potential. Logistical challenges, such as limited access to underwater equipment, training for educators, and safety considerations, pose significant obstacles to incorporating underwater photography into educational settings. Limited resources and technical expertise may hinder schools and educators from effectively utilising this medium, especially in landlocked or economically disadvantaged regions. Moreover, the underwater environment presents unique challenges, including variable lighting conditions, limited visibility, and equipment maintenance, which further complicate the process of capturing high-quality images for educational purposes.

Nevertheless, amidst these challenges, there are numerous opportunities for innovation and engagement. Underwater photography offers a powerful way to transcend geographic boundaries and bring the wonders of the underwater world directly into the classroom. Through virtual dives, interactive multimedia presentations, and online resources, educators can provide students with immersive learning experiences that foster curiosity, empathy, and environmental stewardship. Technological advancements, such as underwater drones and 360-degree cameras, are expanding the possibilities for capturing and sharing underwater imagery, making it more accessible and versatile for educational purposes.

Moreover, underwater photography offers a unique opportunity for interdisciplinary learning by connecting the realms of science, art, and environmental advocacy. By incorporating photography into educational programmes across different subjects, educators can foster creativity, critical thinking, and intercultural awareness among students. Furthermore, underwater photography has the power to amplify the voices of marginalised communities, shedding light on the cultural importance of marine environments and advocating for social justice in conservation initiatives.

In conclusion, despite the challenges that remain, the potential of underwater photography in education is immense and revolutionary. By embracing innovation, collaboration, and inclusivity, educators can leverage the power of underwater photography to motivate a new generation of environmental leaders and advocates who are well-prepared to tackle the intricate issues affecting our oceans and planet.

Recommendations for Educators and Policymakers

Recommendations for educators and policymakers provide practical guidance on how to integrate underwater photography into educational curricula and advance marine conservation efforts. Firstly, educators are encouraged to incorporate underwater photography as a dynamic and interdisciplinary teaching tool across various subjects, including science, art, geography, and environmental studies. By integrating photography into lesson plans, educators can engage students in hands-on activities, virtual field trips, and multimedia presentations that promote experiential learning and foster a deeper understanding of marine ecosystems. Berger (1972), suggests that visual recognition is a fundamental, instinctive process that occurs prior to and independent of linguistic expression. This perspective underscores the importance of direct visual engagement in shaping our understanding of the world, emphasizing that our initial, intuitive interactions with images and scenes are primary and foundational, laying the groundwork for later verbal or conceptual articulation.

Furthermore, educators should prioritize experiential learning opportunities that allow students to directly interact with underwater photography equipment, such as underwater cameras or drones. By providing access to these tools and facilitating hands-on experiences, educators can empower students to explore marine environments firsthand, develop technical skills, and cultivate a sense of curiosity and wonder about the natural world.

Additionally, policymakers are encouraged to support initiatives that promote the integration of underwater photography into educational curricula and outreach programs. This may include allocating funding for equipment purchases, providing professional development opportunities for educators, and forming partnerships with local conservation organizations or photography associations. By investing in these initiatives, policymakers can help ensure that all students have access to high-quality educational experiences that foster environmental literacy and stewardship.

Furthermore, policymakers have an important role in promoting the use of underwater photography to raise public awareness and mobilize support for marine conservation efforts. By incorporating visual media into public outreach campaigns, policymakers can effectively convey the significance of marine conservation and inspire action among communities, stakeholders, and decision-makers.

To summarize, by embracing underwater photography as a potent educational tool and advocacy platform, educators and policymakers can empower the next generation of environmental leaders and advocates to safeguard and preserve our oceans for future generations. Through collaboration, innovation, and dedication, we can harness the transformative power of underwater photography to establish a more sustainable and fair future for everyone.

CONCLUSION

The research on the effectiveness of underwater photography in environmental education and marine conservation has yielded several important findings. These findings highlight the potential of underwater photography as an educational tool. Firstly, underwater photography has been shown to significantly enhance student engagement and interest in marine ecosystems. It sparks curiosity and fosters a deep emotional connection to the natural world. Through immersive experiences provided by underwater imagery, students gain a deeper understanding of marine

biology concepts and ecological dynamics. They go beyond traditional classroom boundaries and explore the wonders of the underwater world firsthand. Kulvicki (2006), assertion that the special quality of pictures is not solely determined by how we perceive them, but by how they relate to one another, highlights the importance of context and relationships in visual storytelling. This perspective suggests that the significance of images often emerges from their interplay within a series or their connection to a broader narrative. The relationship between images, such as contrasting or sequentially arranged visuals, can create deeper meanings and highlight issues more powerfully than isolated images alone.

Moreover, exposure to underwater photography positively influences students' attitudes and behaviours towards conservation. It inspires a sense of stewardship and responsibility towards protecting marine environments. By witnessing the beauty and fragility of marine ecosystems through visual media, students are motivated to adopt more sustainable practices and actively contribute to conservation efforts. Additionally, underwater photography offers a platform for interdisciplinary learning and cultural exchange. It bridges the gap between science, art, and environmental advocacy. By integrating photography into educational curricula and outreach initiatives, educators and policymakers can empower the next generation of environmental leaders and advocates. These young individuals can become stewards of our oceans.

Overall, the findings of this research highlight the transformative potential of underwater photography. It fosters environmental awareness, promotes marine conservation, and inspires positive change for the future of our planet.

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