

***Segara Kerthi* Concept as A Source for Developing Educational Games in Pererenan Village**

I Made Wiradnyana*, I Wayan Suwadnyana, I Putu Adi Saskara

Universitas Hindu Negeri I Gusti Bagus Sugriwa Denpasar

*wiradnyana63@gmail.com

Abstract

The development of educational games has become an increasingly important focus in efforts to improve access and quality of education in various regions, including in rural areas such as Pererenan Village. In this context, the *Segara Kerthi* concept, which describes the management of the marine environment to maintain sustainability, serves as a valuable source of inspiration. This study aims to explore how the *Segara Kerthi* concept can be utilized as a foundation for developing an educational game that promotes environmental awareness and supports local values, as well as to analyze the role of the game as a medium of communication. The method used in this research is research and development (R&D) with a media function theory approach. Data were collected through observation, interviews, evaluation, and literature studies. The research resulted in the development of a game titled *Segara Watch*, which provides an interactive and enjoyable learning experience to introduce knowledge and skills related to marine environmental management and sustainable cleanliness. This game is aligned with the *Pererenan Gumi Lestari* village motto and supports the vision and mission of the Governor of Bali, I Wayan Koster, *Nangun Sat Kerthi Loka Bali*.

Keywords: *Segara Kerthi*; Game Development; Educational Games; Interactive

Introduction

The development of educational games is an important initiative to expand access and improve the quality of learning, especially in rural coastal areas such as Pererenan Village in Badung Regency, Bali. Pererenan, known for its iconic Gajah Mina Statue, is currently facing challenges in maintaining environmental cleanliness. These challenges arise due to limited public awareness, a lack of environmental education, and the need to internalize local cultural values related to sustainability.

In response to these challenges, integrating local wisdom into educational media offers a promising solution. One such local value is the *Segara Kerthi* concept, which emphasizes coastal and marine environmental management (Dinar et al., 2022; Saskara, 2024; Swara et al., 2022). In the Hindu cosmic framework, *Segara Kerthi* represents the sea as a sacred natural element where impurities are dissolved, and thus must be protected from pollution and destruction (Adwitya Sanjaya et al., 2023). Wiana (2018) further explains that *Segara Kerthi* involves preserving the ocean and its contents both physically and spiritually.

This concept is especially relevant to Pererenan Village due to its coastal geography. Moreover, *Segara Kerthi* is rooted in rich Balinese cultural values such as harmony, love for nature, conservation, respect for culture, and spiritual awareness values that align closely with the *Tri Hita Karana* philosophy (Peters & Wardana, 2013; Wiryanan, 2006; Wisnu Wardani, 2019). The integration of these two philosophies forms a strong basis for *ethnopedagogy* a culturally relevant educational approach that fosters both environmental awareness and cultural identity (Sakti et al., 2024; Sudiana et al., 2024).

Despite its relevance, the *Segara Kerthi* concept is rarely translated into educational tools suitable for children. There is a clear gap in the use of local wisdom as the foundation for educational game development in the context of coastal environmental education. Furthermore, existing environmental education materials are often still delivered in conventional formats that are less engaging for children (Oberle et al., 2021; van de Wetering et al., 2022). Meanwhile, digital games have been proven to be effective in increasing learning motivation and conceptual understanding when designed appropriately (Erlyana et al., 2023; Siregar, 2016). By embedding local values in game mechanics and narratives, educational games not only provide cognitive benefits but also serve as cultural transmission tools, especially for early-age learners in regions like Pererenan.

Therefore, this study aims to develop an educational game based on the *Segara Kerthi* concept that functions as a communication medium for children in Pererenan Village. The game is expected to offer an interactive and engaging learning experience using the *learning by play* method, while also strengthening children's understanding of environmental conservation, cultural values, and local identity. Ultimately, this innovation supports the village's motto *Pererenan Gumi Lestari* and aligns with the vision and mission of Bali Governor I Wayan Koster, *Nangun Sat Kerthi Loka Bali*.

Methods

This study employed a research and development (R&D) method with the aim of producing a valid and functional educational game titled *Segara Watch*, which is based on the *Segara Kerthi* concept and designed as a communication medium for environmental education among children in Pererenan Village. The development process followed the R&D model adapted from Borg and Gall, which includes several key stages: (1) preliminary research and data collection, (2) planning, (3) product design and development, (4) expert validation, (5) product revision, and (6) limited-scale field testing (Jamaludin et al., 2024). To analyze the educational role of the game as a communication medium, this research also used the media function theory approach. This theoretical lens helps in understanding how media especially interactive digital games can function not only as instructional tools but also as conveyors of cultural and moral values, particularly related to environmental awareness (Gómez-García & de la Hera Conde-Pumpido, 2023). Data sources in this study were obtained through observation, interviews, and evaluation. Observations were carried out in Pererenan Village to understand the environmental context and cultural nuances relevant to the *Segara Kerthi* concept. Interviews were conducted with selected informants including traditional leaders (Bendesa Adat), elementary school teachers, local environmental activists, and parents in Pererenan. The criteria for selecting these informants were based on their active involvement in environmental, cultural, or educational activities in the village. The game development was supported by Use Case Diagrams, which helped map the specific functionalities of the system and the interactions between users (players/children) and the application (Laksana et al., 2025; Nugroho, 2010; Saskara, 2019). The core features of the game were designed to reflect the values of *Segara Kerthi* through playable missions related to cleanliness, conservation, and cultural rituals near the coast. The validation stage involved expert judgment from two media experts and one environmental education specialist. Each expert was given access to the prototype of *Segara Watch* and a structured validation instrument assessing aspects such as content relevance, game functionality, cultural integration, and usability for the target audience. Revisions were made based on the feedback before conducting a limited trial with 10 elementary school students in Pererenan to evaluate usability and user engagement.

Results and Discussion

1. Application of *Segara Kerthi* as a Source for Educational Game Development

The process of implementing the *Segara Kerthi* concept can be seen from the theme and gameplay, the gameplay of which invites users to pick up trash from the sea. The application of the *Segara Kerthi* concept can of course also be seen from the objects used in developing this game, such as the main character, challenges, backdrop, background and others. This can be seen in table 1 which contains objects that are synonymous with the sea and also cleanliness issues.

Table 1. Objects in educational games based on the concept of *Segara Kerthi*

Objects	Explanation
 Main Character	The application of the <i>Segara Kerthi</i> concept can be seen in the design of the main character who wears diving equipment that is synonymous with water and the sea. This character design conveys the message that managing the marine environment cannot be done alone, it requires tools, experience and expertise gained from sustainable habits.
 Challenge Trash	The application of the <i>Segara Kerthi</i> concept is also reflected in the most unresolved environmental problem, namely waste in the sea. Trash is a challenge in this game. The waste in this game is quite varied, such as plastic waste, canned waste, cardboard, paper, bottles and so on. In order to keep the sea sustainable, of course it must be freed from rubbish.
 Scene Game Over	This game over scene is certainly a reflection of the impact of the user's failure to protect the beach environment or neglect to implement the <i>Segara Kerthi</i> concept.
 Scene You Win	This scene is an illustration of the impact of the user's success in protecting the beach environment or success in implementing the <i>Segara Kerthi</i> concept itself.
	The fish in this game are also a challenge in the game where the main character has to look after the fish so that they don't eat trash. The application of the <i>Segara Kerthi</i> concept will be successful if the ecosystem and animals in the sea are successfully maintained and preserved.

Objects	Explanation
	<p>This backdrop is also the result of thinking about the <i>Segara Kerthi</i> concept which reflects the management of marine and coastal areas.</p>
	<p>This logo also really reflects the <i>Segara Kerthi</i> concept, where there is an icon of water bubbles, a protected hammerhead shark, a diving glass, and the words Segara Watch. Overall, this means that in order to protect the coastal and marine environment, we must be able to conserve water, animals and the ecosystem in the sea itself.</p>
	<p>Because <i>Segara Kerthi</i> is a marine and coastal management concept, the game background is adjusted to the theme of this game which is based on this concept.</p>

2. The Role of Games as a Communication Media Perspective of Media Function Theory

The educational game created from the results of this research is called Segara Watch in accordance with the aims and objectives of this game to provide lessons about marine and coastal environmental management. Like other media, this game has a significant role as a communication medium. In media function theory, the role of the Segara Watch game as a communication medium can be understood through various main functions which can be grouped into three dimensions in accordance with the assumptions of media function theory.

a. Information Dimension

As a source of information, games based on the *Segara Kerthi* concept can have several important functions such as:

- 1) Conveying cultural information, games can be an effective tool for conveying information about the culture, traditions and values of a community or group. By applying the *Segara Kerthi* concept, games can integrate cultural elements in detail, such as symbols, attitudes and visual images that reflect cultural identity.
- 2) Cultural and ethical education, where games that utilize the *Segara Kerthi* concept can be used as a means to teach cultural and ethical values to players, especially children. Through narrative and situations in the game, these values can be illustrated and explained in an interesting way and of course very easy to understand.
- 3) Games as interactive learning, where the *Segara Kerthi* concept which emphasizes involvement and harmony can provide an interactive and interesting learning experience. Players will be involved in exploring the world in the Segara Watch game, interacting with characters and non-player characters (npc), and completing tasks that are relevant to the information they want to convey.

- 4) The Segara Watch game can provide information and knowledge through various means, such as text in the game, character dialogue, visuals, and challenges that must be completed. By designing the game with the *Segara Kerthi* concept, the information to be conveyed can be integrated in a way that is integrated with the game flow.
- 5) Using the *Segara Kerthi* concept in the game can help create an interesting and memorable gaming experience for players. This helps maintain player interest and motivation to continue interacting with the information provided in the game.
- 6) Games can also utilize the symbols contained in them to communicate information in a more powerful way than words. The concept of *Segara Kerthi* can help in the use of meaningful and consistent symbolism in games such as time symbols, waste and others.
- 7) In its application, the Segara Watch game can provide a mechanism for tracking player progress and understanding of the information presented. This can help teachers or parents to monitor the extent to which the information is absorbed and understood by children. This can be measured through the scores obtained through the game.

According to the results of an interview with Informant 1 as a parent, he said that, the *Segara Kerthi* game is very interesting and provides knowledge or simulations about how children should treat rubbish in the sea with visuals that are quite simple and easy to understand. This is similar to what was conveyed by Informant 3 who stated, this game taught me about how to prevent fish from eating rubbish and what happens if the rubbish is not picked up and this game made me interested in winning it.

Based on several functions of the information dimensions explained above and also from interviews, it can be said that the Segara Watch game is a source of information that provides a new learning experience about how to manage the sea and protect marine ecosystems with visuals that are simple and easy to understand for children.

b. Dimensions of Engagement

As a correlation medium, games that adopt the *Segara Kerthi* concept can have an important role in connecting various information, concepts or elements in an integrated manner. The following are several functions that games based on the *Segara Kerthi* concept as a correlation medium can have:

- 1) The game connects the concept of *Segara Kerthi* which emphasizes balance and harmony. In games, this can be interpreted as the use of narrative that connects *Segara Kerthi*'s concepts in a coherent way. Players can see how various elements relate and influence each other in the context of the game.
- 2) Games build bridges between materials, which means games can help connect various types of information or different materials into one meaningful whole. Like the *Segara Kerthi* concept which is combined with an entertainment application that provides education to its users.
- 3) Understand the implications of actions, which means that in the game all player actions have their own consequences and impacts. Players will see how their actions in one area affect the game as a whole.
- 4) Teaching the application of the *Segara Kerthi* concept, in this case meaning that games that use the *Segara Kerthi* concept can provide opportunities for players to apply the *Segara Kerthi* concept that they have learned in a broader context. This can help strengthen their understanding of how the concept works in the simulation and then apply it in real situations.
- 5) Providing contextual learning, which means that the *Segara Kerthi* concept highlights the importance of context in giving meaning to information. In games,

this can be applied to provide information in a broader context, allowing players to better understand the implications and relevance of that information.

- 6) Games provide a holistic experience, namely by connecting various elements in the game, the *Segara Kerthi* concept can create a holistic experience that allows players to see the big picture and the relationship between various aspects that refer to cause and effect.
- 7) Encourage analysis and critical thinking, which can be interpreted in games that use the *Segara Kerthi* concept as being able to stimulate players to analyze the relationship between game elements, as well as encourage them to think critically about how their actions and decisions can influence the game.
- 8) Present information with involvement, which means the game can convey information in a more convincing and involved way. Players can feel the correlation between their decisions and changes in the game, which can make the information more relevant and meaningful.

From the several functions above, it can be said that, by utilizing the *Segara Kerthi* concept in making games as a correlation medium, we can create experiences that combine various aspects of information in a harmonious and coherent way which makes this game have more value than games in general.

This is also supported by the statement of Informant 5 who stated that, every action or movement in this game really reflects the real situation of behavior and impacts caused when throwing rubbish carelessly, especially rubbish around the beach and sea.

3. Entertainment Dimensions

As entertainment, games based on the *Segara Kerthi* concept can have several functions that can provide a rich and memorable entertainment experience:

- a. Games provide an engaging visual experience. This means that the *Segara Kerthi* concept in the game emphasizes visual harmony and a balanced layout. This certainly produces a visual experience that is attractive, aesthetic and captivating to players. Simple, beautiful designs that are consistent with children's ages can enhance the playing experience and provide entertainment through prominent visual elements.
- b. Games provide fun challenges: Games that apply the *Segara Kerthi* concept as in this game can provide balanced and measurable challenges. These challenges can provide a satisfying sense of accomplishment when successfully overcome, thereby increasing the level of entertainment in playing.
- c. Games that provide fun and interesting experiences can be a good tool to relieve stress and provide entertainment. Players can be distracted from their daily lives and enjoy free time by playing games.
- d. Appropriate use of visual effects and sound harmony can enrich the in-game entertainment experience and immerse players in the rhythm of the game.
- e. The game provides the opportunity to play repeatedly. This means that games based on the *Segara Kerthi* concept can offer a gaming experience that has repeat viewing value. Players can enjoy replaying this game because of the challenges this game provides to get higher scores

From the several functions above, it can be said that games as a form of entertainment can create an engaging, challenging and meaningful gaming experience for players. According to informant 7, one of the teachers in Pererenan Village stated that, this game can provide entertainment for me, even though this game is intended for children. However, I feel challenged to get a high score in this game. This game can relieve my anxiety even for a moment.

The statement above is also supported by a similar statement from Informant 8 who stated that, this game provides simple but attractive visuals, as well as background music that makes me feel happy and the game flow is exciting and challenging, making me want to play while spending my free time at home.

From the two statements above, it can be said that the function of the Segara Watch game is as an entertainment medium, providing an exciting experience to users with a challenging plot and visuals and music that are in harmony with the game flow. Overall, the function of the game is based on the concept of *Segara Kerthi* as a communication medium for children. If seen from the theory of media function, it can be said that the Segara Watch game has a more complex role than just providing entertainment. Of course, in this case the Segara Watch game as a communication medium plays an important role in shaping children's perceptions and understanding of the world. By combining information, interpretation and entertainment, media helps shape individual views and attitudes towards various social, cultural and political problems that exist in life, both simulated and realistic.

Conclusion

Based on the description and research results, it can be concluded that *Segara Kerthi*, as a concept for marine environmental management in Balinese culture, provides a deep view of harmony between humans, nature and God. In the context of educational game development, this concept provides a rich foundation for designing learning experiences that are closely linked to environmental and sustainability values. By incorporating *Segara Kerthi* values into game content and design, developers can create a more meaningful and authentic learning experience for the people of Pererenan Village to protect their natural environment. Not only that, as a communication medium, Segara Watch game have an important role in improving access and quality of education, especially in the Pererenan Village area. By using technology and interesting interactions, the Segara Watch game can provide effective and fun learning for players to introduce knowledge and skills relevant to marine environmental management and sustainability.

References

Adwitya Sanjaya, P. K., M. Rudi Irwansyah, & I Putu Arya Dharmayasa. (2023). Pengembangan Tanah Lot Sebagai Wisata Spiritual: Suatu Kreasi Model Pembangunan Berkelanjutan. *Edunomics Journal*, 4(1), 87–94.

Dinar, I. G. A. A. G. P., Sugiarktha, I. N. G., & Mulyawati, K. R. (2022). Strategi Pemulihan Keberlanjutan dan Ketangguhan Pariwisata Menghadapi Krisis. *Kertha Wicaksana*, 16(2), 158–163.

Erlyana, Y., Everlin, S., & Yuwono, I. F. (2023). Analisis Color Palette Berdasarkan Rasa Warna sebagai Penguat Daya Tarik Emosional dalam Video Anak. *ANDHARUPA: Jurnal Desain Komunikasi Visual & Multimedia*, 9(03), 396–411.

Gómez-García, S., & de la Hera Conde-Pumpido, T. (2023). Newsgames: The Use of Digital Games by Mass-Media Outlets to Convey Journalistic Messages. *Games and Culture*, 18(4), 449–474.

Jamaludin, D. A., Henderi, H., & Bin Ladjamudin, A. B. (2024). Development of Android Application-Based E-Learning Learning Media Using the Borg and Gall Method. *JINAV: Journal of Information and Visualization*, 5(1), 171–180.

Laksana, M. A. I., Priyadi, Y., & Wibowo, Y. F. A. (2025). Formation of Use Case Scenario Based on Use Case Diagram Using Text Semantics for IdVar4CL Application Development. *2025 10th International Conference on Signal Processing and Communication (ICSC)*, 415–420.

Nugroho, A. T. (2010). *Pemrograman Game dengan Java dan GTGE*. Yogyakarta: Andi.

Oberle, E., Zeni, M., Munday, F., & Brussoni, M. (2021). Support Factors and Barriers for Outdoor Learning in Elementary Schools: A Systemic Perspective. *American Journal of Health Education*, 52(5), 251–265.

Peters, J. H., & Wardana, W. (2013). *Tri Hita Karana The Spirit Of Bali* (A. Primanda, Ed.; 1st ed., Vol. 1). Jakarta: Gramedia.

Sakti, S. A., Endraswara, S., & Rohman, A. (2024). Revitalizing local wisdom within character education through ethnopedagogy approach: A case study on a preschool in Yogyakarta. *Heliyon*, 10(10), e31370.

Saskara, I. P. A. (2019). Pengaruh Augmented Reality Senjata Dewata Nawa Sanga sebagai Media Pembelajaran Interaktif Terhadap Pembelajaran Agama Hindu Di SD Negeri 2 Pererenan. *Widya Duta*, 14(2).

Saskara, I. P. A. (2024). Tri Hita Karana as The Foundation for Digital Game Development. *Gelar: Jurnal Seni Budaya*, 22(1), 92–101.

Siregar, N. S. S. (2016). Kajian Tentang Interaksionisme Simbolik. *Perspektif*, 1(2).

Sudiana, I. K., I Made Sugiarta, & Nia Erlina. (2024). Analysis of Scheme Types in the Focus of the Lecturer's Research Area Based on Tri Hita Karana Philosophy. *JPI (Jurnal Pendidikan Indonesia)*, 13(3), 471–482.

Swara, N. N. A. A. V., Wulandari, N. L. A. A., & Kawiana, I. G. P. (2022). Nilai Kearifan Lokal Nyepi Segara Sebagai Modal Sosial Pembangunan Berkelanjutan Daerah Pesisir Nusa Penida. *Jurnal Penelitian Agama Hindu*, 6(4), 213–225.

van de Wetering, J., Leijten, P., Spitzer, J., & Thomaes, S. (2022). Does Environmental Education Benefit Environmental Outcomes In Children And Adolescents? A Meta-Analysis. *Journal of Environmental Psychology*, 81, 101782.

Wiana, I. K. (2018). “Sad Kertih”: Sastra Agama, Filosofi, dan Aktualisasinya. *Jurnal Bali Membangun Bali*, 1(3), 169–180.

Wiryawan, K. G. (2006). *Tri Hita Karana Ekologi Ajaran Agama Hindu Benih Benih Kebenaran*. Surabaya: Paramita.

Wisnu Wardani, D. A. (2019). Nilai Tri Hita Karana Dalam Pasar Jajan Tradisional Naliko Semono Pada Komunitas TIN-THIR Di Kecamatan Jenawi Kabupaten Karanganyar. *Widya Aksara: Jurnal Agama Hindu*, 21(2).