



International Journal Pedagogy of Social Studies

Journal homepage: <http://ejournal.upi.edu/index.php/pips/index>



Revitalization of Ancient Sundanese Manuscript Based on Augmented Reality as an Effort to Preserve Cultural Heritage

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ABSTRACT

Written cultural heritage is an essential part of Sundanese identity that is increasingly threatened by the forces of globalization. Kawih Katanian, an ancient Sundanese manuscript preserved in Kabuyutan Ciburuy, represents agrarian and spiritual values that need to be revitalized. This study aims to develop a digital medium based on augmented reality (AR) for the preservation of the manuscript and to evaluate its effectiveness in an educational context. The research employs a Design-Based Research (DBR) method consisting of four stages: problem analysis, solution design, implementation, and reflection. Data were collected through interviews, observations, and user questionnaires, then analyzed qualitatively through data reduction, presentation, and source triangulation. The results show the creation of an AR prototype featuring four versions of Kawih Katanian presented as interactive flashcards, 3D visuals, and audio narration, which received positive responses from students. The AR media effectively enhances interest, understanding of ancient scripts, and appreciation of the manuscript's content, serving as a contextual and sustainable strategy for cultural heritage preservation.

ARTICLE INFO

Article History:

Submitted/Received 13 Oct 2025

First Revised 04 Nov 2025

Accepted 10 Des 2025

First Available online 12 Des 2025

Publication Date 15 Des 2025

Keyword:

Augmented Reality;

Cultural Revitalization;

Kawih Katanian;

Sundanese Manuscript.

1. INTRODUCTION

Ancient manuscripts are part of the written cultural heritage that hold important historical, aesthetic, and philosophical value for society. In Sundanese culture, ancient Sundanese manuscripts play an important role as evidence of the historical journey of civilization, knowledge systems, and local values that are deeply rooted in the lives of the community. One of the centers for the preservation and development of the Sundanese written tradition in the past was Kabuyutan Ciburuy. In the past, this site functioned as a mandala, a traditional educational institution where priests and teachers wrote and copied various manuscripts that reflected the intellectual progress of pre-colonial Sundanese society (Susanti and Sukaesih, 2024).

The Kabuyutan Ciburuy collection contains various lontar and nipah manuscripts written in ancient Sundanese script covering a wide range of themes, from religion and philosophy to historical stories. The collection at Kabuyutan Ciburuy is estimated to consist of around 30 manuscripts written between the 16th and 18th centuries AD (Artha et al., 2025). However, the collection of ancient manuscripts at Kabuyutan Ciburuy, including Kawih Katanian, is still relatively unknown to the general public and is in a poor condition. Physically, these manuscripts have suffered damage, especially on the left and right sides of each leaf, which are fragile and broken (Daffa and Nurmutia, 2023). This condition not only threatens the continuity of cultural values but also reflects the broader challenges of preserving intellectual heritage amid the tide of globalization.

The rapid pace of globalization has caused local cultures to undergo a shift in values and a weakening of their social functions. The dominance of foreign cultures through digital media and modern lifestyles has distanced the younger generation from their traditional cultural roots. Societies that are increasingly open to innovation often unknowingly discard the old cultural values that once formed the foundation of social life. As a result, cherished traditions passed down from generation to generation are beginning to be displaced, and if this condition is not balanced with continuous preservation efforts, local cultures have the potential to become increasingly marginalized. Local wisdom, which is a characteristic of cultural heritage, can slowly fade under the dominance of foreign cultures (Merung et al., 2024).

In line with these needs, the development of digital technology in the modern era has opened up great opportunities to be used as solutions to various social and cultural problems. The use of interconnected and continuously developing technology enables the creation of innovations that are not only efficient but also educational and adaptive to the needs of preserving local culture (Jamaludin et al., 2025; Widiarti and Adji, 2024). In the context of preserving ancient Sundanese script and manuscripts, technology can play an important role as a bridge connecting cultural heritage with the digital-based learning styles of modern society. One potential form of innovation is the use of augmented reality (AR) technology as a medium for introducing and learning Sundanese manuscripts. This technology works by inserting virtual objects into the real environment, allowing users to see and interact with digital representations simultaneously. Through this approach, Sundanese manuscripts and their local wisdom values can be visualized in an interesting and interactive way, making it easier for users to recognize, understand, and remember them.

The use of AR technology provides a more contextual and enjoyable experience. Users not only read the text, but can also observe the 3D form of the script and understand its meaning through supporting audio. Thus, the application of this media is one way to reintroduce Sundanese manuscripts to the general public, especially the younger generation, to recognize and appreciate Sundanese cultural values through media that is in line with the development of the digital era.

2. METHOD

This study uses a qualitative approach with the Design-Based Research (DBR) method, which focuses on exploring the cultural values of the ancient Sundanese manuscript Kawih Katanian as well as developing augmented reality (AR)-based digital media. According to Barab and Squire in (Khotimaharani et al., 2024), DBR is a method that produces theories, artifacts, and practices that explain and have the potential to impact learning and teaching in naturalistic settings. This method is flexible and contextually sensitive, oriented towards theory development and improvement of educational practices through a process of in-depth analysis, design, implementation, and collaborative reflection between researchers and practitioners in the field (Apriyanto et al., 2024; Ingkadijaya et al., 2024).

The research stages refer to the Amiel and Reeves model in (Dewi and Wulandari, 2024), which includes four main steps: (1) identification and analysis of the problem of preserving the ancient Sundanese manuscript Kawih Katanian in Kabuyutan Ciburuy, (2) development of solutions based on theory, design principles, and technological innovation through the design of an AR application, (3) repeated testing and refinement of solutions based on the results of implementation in the field, namely in schools, by distributing and analyzing student questionnaires to assess the effectiveness and appeal of the media. The findings from this stage will form the basis for entering the next stage, namely (4) reflection and formulation of design principles used to refine the application and serve as a reference for further research.

Research data was obtained from primary and secondary sources. Primary data was collected through interviews with the caretaker (Jupel) of Kabuyutan Ciburuy, philology lecturers, field observations, and the distribution of questionnaires to students using the application. Secondary data was obtained from various relevant literature, documents, and scientific sources. Data analysis was conducted qualitatively through a process of reduction, presentation, and conclusion drawing, which was verified through source triangulation and reflection on the results of trials. The results of this analysis are expected to produce an effective AR-based media model as a means of revitalizing and preserving Kawih Katanian manuscripts in an effort to preserve cultural heritage.

3. RESULTS AND DISCUSSION

3.1. Kabuyutan Ciburuy

DOI: <https://doi.org/>

e- ISSN 2549-6530 p- ISSN 2550-0600

Kabuyutan Ciburuy is one of the historical sites located at the foot of Mount Cikuray, Pamalayan Village, Bayongbong District, Garut Regency, West Java Province. Pamalayan Village was established in 1981 with a land area of 296.928 hectares (Isra et al., 2025). Kabuyutan Ciburuy is the main place that became the basis of Sundanese civilization. According to (Mulyana, 2024), Kabuyutan is a sacred place or center of religious activities for the Sundanese people in the past. These sacred places were built intentionally or formed naturally, not only as religious centers but also as places to obtain education. More details in **Figure 1**.



Figure 1. Bumi Patamon

Source: Fadilah et al., 2025

According to Nana Suryana, the caretaker, the old name of this area was Sunan Kabuyutan Ciburuy Srimanganti Panembong or Gunung Mandala Srimanganti Panembong. In the past, this place was built as a result of deliberations by four kings or religious leaders to unify the teachings of the four scriptures (Torah, Gospel, Zabur, and Al-Qur'an), thus becoming a spiritual, educational, and cultural center for the Sundanese people.

Kabuyutan Ciburuy was once known as a religious and educational center that functioned as a pesantren (Islamic boarding school) and paguron (martial arts school) called Gagak Lumayung and Gagak Lumantung. It was from this place that Sundanese civilization values developed, emphasizing a balance between religion, customs, and culture. The buildings in this area are still made of wood and consist of three main structures:

1. Bumi Patamon serves to entertain or receive guests who come to the Kabuyutan area.
2. Bumi Pangalihan serves to store heirlooms temporarily.
2. Bumi Padaleman is the core building located on the top terrace, serving to store manuscripts and heirlooms, which are only opened during the Seba ceremony in the month of Muharram.

In addition, there are Leuit (rice barns) and Saung Lisung as symbols of the agrarian life of the Sundanese people. Inside, there are relics such as bende, kujang, trisula, peso pangot, and various lontar manuscripts written in ancient Sundanese script. According to the caretaker, some of the relics, such as those of Sunan Bonang, are kept by local extended families. The community also recognizes the story of Resi Kuncung Putih or Munding Wangi (Kebo Bule) as the spiritual guardian of the region, who is believed to still have direct descendants from Pasundan.

The site is maintained by caretakers who are tasked with guarding, inspecting, and preserving the ancestral heritage so that it can be studied and practiced by the current generation. The values upheld in maintaining Kabuyutan include “akhlakul karimah, determination, speech, steps, and tapak gawe,” which reflect the philosophy of life of the Ciburuy community. The community plays a role in preservation through traditional customs such as the Seba ceremony, while the government, through the Cultural Preservation Office (BPK) Region IX Bandung, provides support and recognition in the form of allowances for the caretakers.

3.2. Ancient Sundanese Manuscript

Ancient Sundanese manuscripts are one of the historical sources that can be found in Kabuyutan Ciburuy. Kabuyutan Ciburuy stores manuscripts in three chests. Chest I contains eleven kropak, chest II contains six kropak, and chest III contains four kropak. The condition of the manuscripts there is fairly good, supported by research by (Artha et al., 2025), which states that the condition of the manuscripts is no longer intact, such as the sides that have rotted, resulting in some manuscripts being illegible. This condition is influenced by natural factors (temperature), the presence of termites, the easily decomposable nature of the base material, and the passage of time.

Kabuyutan Ciburuy is not just a place for collecting manuscripts, but a Sundanese scriptorium where scholars and religious leaders copied, wrote, and studied important texts that reflected the thoughts and spiritual values of their community. The manuscripts stored at Kabuyutan Ciburuy have very high historical and cultural value. Several manuscripts, such as Sewaka Dharma, Kawih Katanian, Kisah Putra Rama Rahwana, and Amanat Galunggung, not only reflect the social and religious life of the ancient Sundanese people, but also contain moral messages, leadership ethics, and cosmological views on the relationship between humans and nature. According to (Kartika et al., 2024) understanding the contents of these manuscripts can help reveal the reality of the Sundanese people in the past, provided that it is done with a historical approach and a separation between mythical elements and empirical facts. More details in **Figure 2**.



Figure 2. Bumi Padaleman

Source: Fadilah et al., 2025

Manuscripts are stored based on local wisdom that has been passed down from generation to generation, such as storing lontar manuscripts in wooden boxes in Bumi Padaleman, wrapping them in white cloth to protect them from dust and moisture, and placing them in a shady environment filled with leafy trees to stabilize the temperature and prevent the growth of microorganisms (Wijayanto et al., 2025). Their preservation is maintained through traditional practices, such as the haseup-haseup ritual (burning incense) four times a week, on Wednesday afternoons, Sunday afternoons, and twice daily to deter pests. The manuscript chest is opened only once every three months on traditional Thursdays, while major cleaning is carried out during the Seba ceremony. In addition, educational institutions such as Padjadjaran University (UNPAD) also play a role in manuscript conservation and study programs.

3.3. Kawih Katanian

Box I Kropak 24 contains manuscripts discussing agriculture. From various types of rice, pests, to how to process them, the manuscript is titled Kawih Katanian. This manuscript not only teaches about the fruits of the earth, but also contains teachings of good character and the value of tapak gawe, which is human behavior and work in maintaining the balance of nature. In the Ciburuy tradition, the teachings in Kawih Katanian are manifested in the Seba ceremony as a symbol of gratitude to the earth and the harvest. This ceremony includes old traditions such as mipit-amit ngala bebeja (asking for permission before harvesting) and mitambiyen (the ritual of preparing seeds). These traditions are now beginning to be abandoned, resulting in a decline in the “essence of the earth” or the blessings of the harvest.

The contents of the Kawih Katanian manuscript describe the spiritual relationship between humans, nature, and the Creator. It tells the story of how rice was born from the sacrifice of Dewi Sri (Dayang Tresnawati), which symbolizes the balance of life and gratitude for the fruits of the earth. This teaching emphasizes the importance of appreciating food, not wasting sustenance, and preserving nature. According to (Kartika et al., 2024), the Kawih Katanian manuscript contains everything related to farming. The

content of this manuscript is a fairy tale that is usually told to children when they do not finish their rice. There are several versions of the story about the origin of rice.

*(I)ni kawih Katanian, basa méméh turun tahun,
dipilémék ti henteu na, su(n)dah waya ka sakala*

The above text serves as an introduction or opening to the manuscript. This section also provides information about the title of the manuscript. It is followed by a second section that tells the story of the birth of Dewi Sri or Dayang Tresnawati.

*(diheu)eum di Kahyangan, mipilung ara déwata.
Ayeuna auman ageung, saur Batara sakini,
"Anaking para déwa (ta pahi kumpul) sarenana."*

It began with a grand meeting held in Heaven (Kahyangan) by order of Batara Guru. However, there was one god who did not attend the meeting. Until the final draft, which tells the origin of rice and pests. The Kawih Katanian manuscript also contains moral values for those who practice it. According to (Daffa and Nurmutia, 2023), the contents of the Kawih Katanian manuscript explain in depth the relationship between humans, nature, and beliefs. In the early part of the manuscript, it describes a grand meeting of the gods, pancaaksara, lokapala, and pancabyapara led by Batara Guru. This meeting symbolizes the gods' responsibility to bring prosperity to the earth. The presence of Sanghyang Naga, who was initially absent, is an important sign, because the dialogue between the gods and him contains a message about the continuity of life. From this myth emerges the profound teaching that rice is not just a food source, but a sacred inheritance from our ancestors that unites humans with the universe.

The second part of the Kawih Katanian manuscript tells the story of the origin of rice, which was born from the tears of Sanghyang Nagaraja. These tears fell to the ground and transformed into the egg of Sanghyang Hantiga, which was then incubated by Batari Uma until it hatched into a girl named Sang Srikandi. Batara Guru then named this figure Sri Sadaya Trisnawati or Dayang Tresnawati, who became a symbol of fertility and the beginning of rice farming. This story illustrates the spiritual concept that all life on earth is the result of love and sacrifice, which is in line with the agrarian community's view of the importance of balance in nature (Kurniawan et al., 2025).

Furthermore, in the third part, it is told that Dayang Tresnawati descended to earth and died. From her buried body, various types of rice grew from head to toe, which became a new source of life for humanity. Hyang Bagawat, who witnessed the event, reported it to Batara Guru in heaven while bringing the increasingly abundant rice. This part is the core of the manuscript's teaching, that new life is always born from sacrifice, and rice is a divine gift that must be protected and respected.

Meanwhile, the last part of the manuscript mentions several regions in the archipelago, such as Palembang and Bali, as evidence of the widespread tradition of

DOI: <https://doi.org/>

e- ISSN 2549-6530 p- ISSN 2550-0600

agriculture and belief in the goddess Dewi Sri. The story then concludes with Dayang Tresnawati's return to heaven and an explanation of farming practices, from sowing seeds and tending crops to protecting them from pests. This section also mentions pupuhunan as a sacred place for storing rice, which symbolizes the glorification of the earth's produce. From this teaching, we learn that the process of turning rice into rice is very long and labor-intensive, so humans are taught to appreciate the hard work of farmers, not to waste food, and to maintain food security as a form of gratitude for the gifts of nature.

Kawih Katanian not only functions as religious literature or folk tales, but also as a means of moral and cultural education that has been passed down from generation to generation. This manuscript contains philosophical messages about the balance between humans and nature, as well as collective responsibility in protecting the sources of life. It contains ecological, spiritual, and social ethical values that are highly relevant in the modern context, especially in facing issues of food crisis and environmental degradation.

3.4. Application of Augmented Reality Technology with Ancient Sundanese Kawih Manuscripts at Kabuyutan Ciburuy

The augmented reality (AR) application developed in this study contains four main editions of the Kawih Katanian manuscript, which are implemented in the form of interactive flashcards. Each card represents one section of the manuscript that can be scanned using a digital device camera. Once scanned, a 3D visual display and audio narration appear, presenting the contents of the manuscript along with an explanation of its symbolic meaning. This innovation not only provides an engaging technology-based learning experience, but also fosters students' awareness of the values of local wisdom. More details for Ciburuy ARTifact Application Menu Display in **Figure 3**.



Figure 3. Ciburuy ARTifact Application Menu Display

Source: Fadilah et al., 2025

Based on the results of the study, the implementation of AR media containing local wisdom values from the Kawih Katanian Kabuyutan Ciburuy script in learning showed excellent results. This can be seen from the responses of the students, where 8 students scored 56-59, 11 students scored 52-55, and 4 students scored 48-51. Meanwhile, only

2 students showed disagreement with scores of 44-47 and 40-43. These results indicate that AR media was well received and considered effective by students in Figure 4.

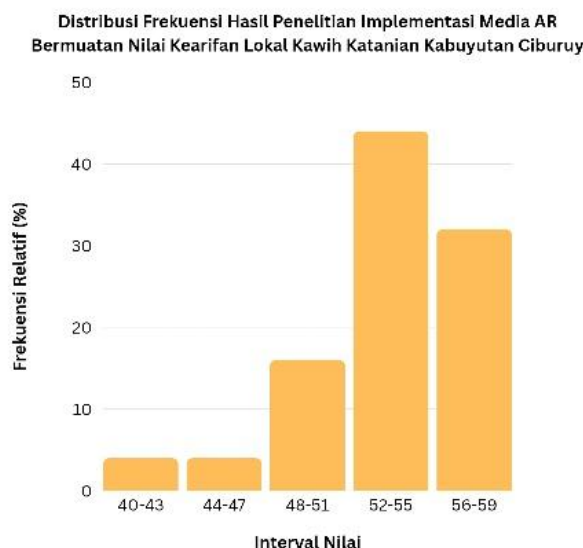


Figure 4. Frequency Distribution of Research Results on the Implementation of AR Media Loaded with Local Wisdom Values of Kawih Katanian Kabuyutan Ciburuy

Source: Fadilah et al., 2025

This positive reception is inseparable from the innovative and contextual design of the media. The use of AR in the context of preserving ancient Sundanese cultural heritage, particularly the Kawih Katanian manuscript in Kabuyutan Ciburuy, is an effort to integrate technological elements with local cultural values. The manuscript, which was previously only accessible to a limited extent, can now be recognized, studied, and experienced interactively by the younger generation.

Overall, the results of this study show that technology and tradition can go hand in hand. The use of AR serves as a bridge to revive cultural heritage that has been almost forgotten, while also opening up new opportunities in local history and culture in the digital age (Nurjanah et al., 2025). This approach not only enriches the learning experience, but also supports efforts to preserve cultural heritage in a way that is more adaptive to the character of the younger generation who are familiar with visual technology.

4. CONCLUSION

The results of the study show that revitalizing the ancient Sundanese manuscript Kawih Katanian through augmented reality (AR) media is an effective innovation in reintroducing local cultural values to the younger generation. The integration of cultural

DOI: <https://doi.org/>

e- ISSN 2549-6530 p- ISSN 2550-0600

heritage and modern technology makes manuscripts that were previously difficult to access more interactive, interesting, and easy to understand. These findings prove that the use of digital technology can be a strategic means of maintaining the sustainability of literacy traditions and preserving the cultural identity of the Sundanese people.

The implementation of AR media in the context of learning received very positive responses from students. The test results show that this media is able to increase interest, understanding, and appreciation of the contents of the Kawih Katanian manuscript, which is rich in moral, ecological, and spiritual values. The three-dimensional visualization and audio narration presented make the learning process more contextual and enjoyable, while also fostering awareness of the importance of maintaining a harmonious relationship between humans and nature, as is the main message of the manuscript.

Integrating digital technology and local wisdom, this study proves that the process of cultural preservation is not limited to physical conservation, but can also be realized through digital-based innovations that are relevant to the character of the younger generation. The AR media developed can be an effective alternative in supporting culture-based learning and strengthening efforts to preserve cultural heritage in a contextual and sustainable manner.

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